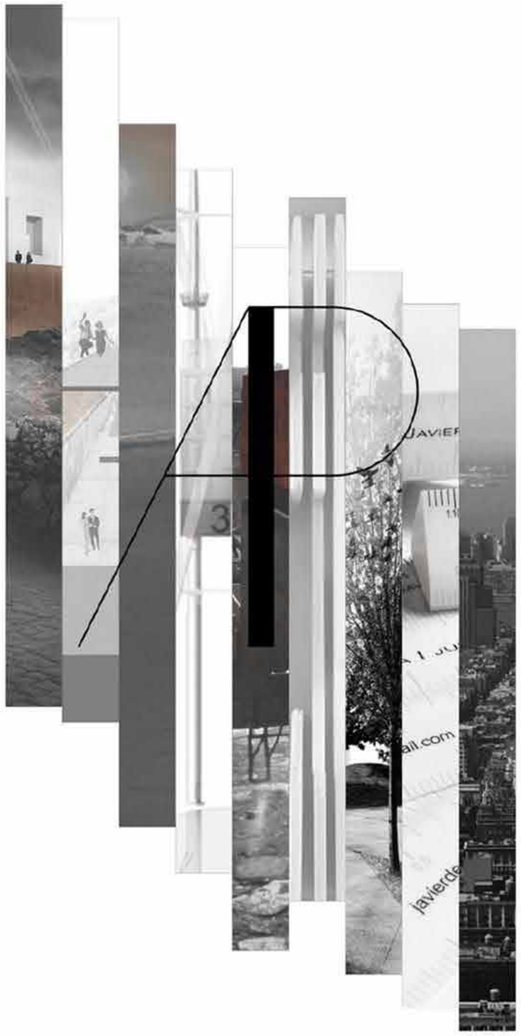


UNIVERSITY OF JOHANNESBURG

Graduate School of Architecture

Supervisor: Mr Gregory Katz
Co-Supervisor: Mr Nico van Loggerenberg

Dissertation

Masters Portfolio - Building together - Innovating traditional methods with community construction.

ISHMAEL TLANGELANI MASHABA
201510830

Part 1: MAJOR DESIGN PROJECT & MINOR DISSERTATION

1: FRAMING STATEMENT

Scale_Shift

Too hard, too soft, too big, too small, too hot, too cold - just right!

Unit 17's research interrogates and broadens the range of techniques, materials and processes with
which we build, by taking on the project of thinking-through-making. The contemporary philosopher
Richard Sennet describes the process of making, as a kind of dance between problem-finding and
problem-solving.

Architecture and making are part of an iterative process of feedback loops. Whether it be a conceptual
maquette or a 1:1 prototype, in the act of making we uncover the many hidden and under-exploited
potentials of our materials. This explorative process opens-up new possibilities for how we use materials
and what we do with them.

We make, we discover, we draw, and we think. We make with our hands, with tools and with machines,
both analogue and digital. We recognise that the technologies we adopt are integral to design, from
conceptualisation to production.

All big societal issues can be discussed through the lens of materiality and making. Making is not just about how we make and what we make with, but it can broaden and deepen our understanding of the environment, politics, ideology and context. Whether your obsession is climate crisis, global migration, gender dynamics, class or labour issues, material scarcity, polarising politics, surveillance paranoia, landownership, throwaway
culture – it's all material.

Each year Unit 17 selects a fairy tale as a catalyst for our research. As a narrative device, fairy tales allow us to temporarily suspend belief. Things that may seem impossible or contradictory are easily reconciled and a space is created for fantastical encounters.

Over the past 3 years our research has looked at innovative building materials (The Fourth Little Pig), alchemy and detective-work (Rumple-stilt-skin) and reverse engineering (Hansel, Gretel and a Trail of Breadcrumbs). This year it's the idea of shifting scales and calibrations as conveyed in the Goldilocks story: too big, too small, too hot, too cold, too hard, too soft... just right. Through strategies of comparison, of incremental adjustment, of intensification and transposition we find unexpected ways forward.

Unit 17's methodology is to look deeper, to assess our findings, to pull them apart and make something new.

2: YEAR PROGRAMME 2019

The Dissertation comprises three main parts:-

Part 1: MAJOR DESIGN PROJECT (Years 1 & 2)
Part 2: HISTORY & THEORY DISSERTATION
Part 3: PROFESSIONAL PRACTICE COURSEWORK/ SUMMARY & ESSAY

3: EXPANDED ABSTRACT & PROPOSAL:

TITLE: Reimagine informal settlements through South African traditional Building techniques

“There is immense power when a group of people with similar interests gets together to work toward the same goals, to build a community that allows hard questions and honest conversations so it can stir up transformation in one another.” (I. Koyenikan, 2016).

In contemporary society, many of the values of traditional community building practices have been lost. In comparison to the rewards communal decision making and togetherness, most decisions in urban areas are taken by developers, with profit as the primary incentive. Material choices, are made based on speed, economy, and existing practices.
In comparison, traditional building materials are chosen for local availability, indigenous knowledge, and minimal transport requirements.

This thesis aims to create an alternative model using modern interpretations of traditional methods: building for the community, with the community.

The practice of communal building offers a clear link to the concept of Ubuntu. “Umuntu ngumuntu ngabantu”, translated as “I am because we are”, shows this belief in a universal bond, of humanity towards others. The practice of Ubuntu is to help improve the life of one’s neighbour, in a longstanding tradition in South African societies. (T. Metz, 2011). This practice is about more than individual rights, it’s about communal action. It implies the ability to change ourselves through changing the city. The opportunity to make and revamp our urban areas is one of the most valuable yet generally neglected of our rights as citizens, using the philosophy of ubuntu to inform a new way to build in contemporary cities. (D. Harvey, 2012). Rather than a tender process going to the lowest bidder, this method focuses on a social ‘stokvel’ model, where labour is exchanged directly.

Novel building materials and methods will also be explored using scale models. Traditional materials such as cow dung will be mixed with non-toxic new materials to create stronger and better building materials. Prototype structures will be tested at scale.Social media platforms, websites and mobile applications will be used to engage interested community members in the process.

To document existing techniques, experts on community building and traditional techniques will be interviewed. This valuable knowledge will be compiled and shared through videos and dialogues. A graphic novel will be created as a narrative device that explains these alternative processes, from start to finish.

This thesis aims to discover whether an alternative approach to building financing, construction, and materials can be used to create better built environments. This approach will be based on traditional methods and processes, using locally available materials enhanced with modern additives, processes, and knowledge. A new approach to labour, logistics, and community involvement will need to be developed. The visionary objective is to design a community building concept that will be instigated by architects and orchestrated by the community. It is about building for the community with the community. Through this process, the “right to the city” is enhanced and citizens are empowered to have a greater influence on their environment (D. Harvey, 2012).

PROBLEM/PROPOSAL STATEMENT

A place of preservation of South African traditional building techniques

As an individual who has inhabitant both rural and urban contexts. Experiencing both its differences, I have released how building with traditional methods has been abandoned in an urban contexts therefore I started questioning why are people not building with this techniques because there's so much rich knowledge behind this techniques that lacks the documentation to be exported to reach the masses. The Expects who know how to build with these techniques are aging and dying therefore they are dying with this rich knowledge without exporting it enough. It is important to me to keep practices of our ancestors relevant in this age and time.

South Africa is full of informal settlements that are built from materials that are not good for the weather conditions in the area that we live in. There's a high unemployment rate problem meanwhile we are surrounded by traditional building techniques that are being forgotten about. My project is a way to upgrade existing informal settlements and to creates work by teaching people how to building with upgraded traditional building techniques.

The project consists of interviews made with some expects but we are living in the 20th century filled with technology, How do we keep the motion of collecting more of this knowledge? A website that links with social media that allows people from different places to share and engage with their knowledge will be used as a database to collect more information.

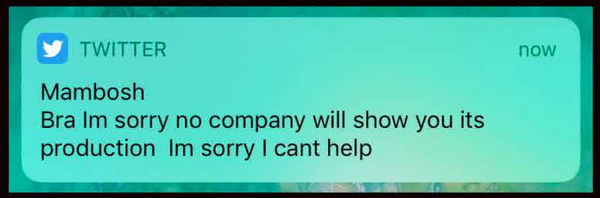
In rural areas like Marite Trust in Mpumalanga, building with these techniques has been established and working for many years because:

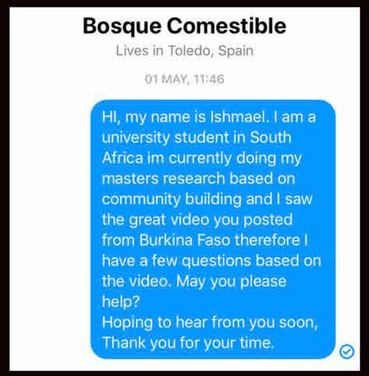
- It uses locally available materials that are affordable and carbon neutral.
- It's cheaper and saves people a lot of money.
- One does not need huge transportation to bring the materials to site.
- It uses construction methods that are low-tech and easily accessible.
- A building process that eliminates the middleman between the devel opers and the people.
- It consists of a community building system as Ubuntu to uplift a neigh bour's well-being within the community. I grew up in an area were a stokvel was used as a grocery scheme during festive season which unpacks the effectiveness of building with the community.
- It is safer and able to fight against natural cold/hot conditions.
- It has a long sustainable history to it that has been passed on from generations to generations.

This project aims to introduce traditional building techniques in urban contexts that people need to be taught how to build with these methods.

Crowdsourcing information

#VernacularArchitecture





#Facebook_

#Twitter

Lincoln Mokoena
Folks build/built with dung? Not mud? Damn!
4 d Like Reply

Ishmael The-Ish Mashaba
Yeah. There's gang stuff we don't know about traditional Architecture mate.
4 d Like Reply

Nokwanda Makwa...
Active now

07 APR, 15:22

We have cows at home

Njabulo Maseko
Bese makusindwa phansi ubulungwe abuhlanganiswa nalutho ke bona
4 d Like Reply See Translation

Emmanuel Jnr Cebolenkosi Ndlozi
Njabulo Maseko makwenziwe udonga kuhlanganiswa nodaka, kodwa makuyiphansi ubulongwe bodwa?
4 d Like Reply See Translation

Ishmael The-Ish Mashaba is at **UJ FADA**.
Posted by Ishmael The-Ish Mashaba
Tuesday at 14:36 · Johannesburg ·

Hello, Sanibonani, ninjani?? NiRight?
.
Okay bona, I'm designing a system that evolves around traditional building techniques, which includes the use of cow dung(Bulongo, maKaka yenti nkomo) therefore does any of you know someone who might have any knowledge about building with COW DUNG or the use of cow dung in any form during the ancient days or current days or someone who owns cows? Could be your granny, Aunty, neighbors or anyone you know off.
.
Please hit me up, your help will be appreciated. I can slide in some coins 💰 if need being.🙏
.
Thanks!

Joana Nguyuza
Hi boy i know someone who owns cows around my place
4 d Like Reply

Ishmael The-Ish Mashaba
Hi, alright ses wam' I will inbox you. Thanks.
4 d Like Reply

Mlamuleliwezwe Mabaso
Ubhuti Ontsundu
4 d Like Reply

Ishmael The-Ish Mashaba
nakanjani, taking it to izinyanya zethu🙏
4 d Like Reply

Nontando Shongwe
I know traditional dung smearing for celebrations
4 d Like Reply

Ishmael The-Ish Mashaba
Very interesting. I will inbox you just now.
Thanks Ntando🙏
4 d Like Reply

Hombe VaHlave
There's a lot of grannies who do this in my hood
4 d Love Reply 1

Ishmael The-Ish Mashaba
Hombe VaHlave awe bro. Do you think it's possible to get me in touch with some of these grannies?
3 d Like Reply

Ntembeko Ngwanya Nesh
Ola broski the technique is called ukusinda, instead of putting tiles on the floor you smear the whole floor with cows dung. One of the benefits is that if you drop a glass 🥃 it won't break 😬. If it's blazing hot outside, it's cool on the inside and if it's cold on the outside it's warm. This shit works like an aircon bro (pun intended) 👍🏾
4 d Like Reply 1

Ishmael The-Ish Mashaba
Awe. That's some crucial infor brayam' let me inbox you, right away! Thanks.
3 d Like Reply

22 14 comments 8 shares
Love Comment Share

Njabulo Maseko
Lol yake yaphahlekwan indlu ngobulongwe?
4 d Like Reply See Translation

My aunt can assist I'll speak to her, dung business

Awe. Thanks for reaching out bro. Does she have an operating dung business?

We just have a kraal with inkomo, she sometimes uses the dung for personal reasons for the floor and walls

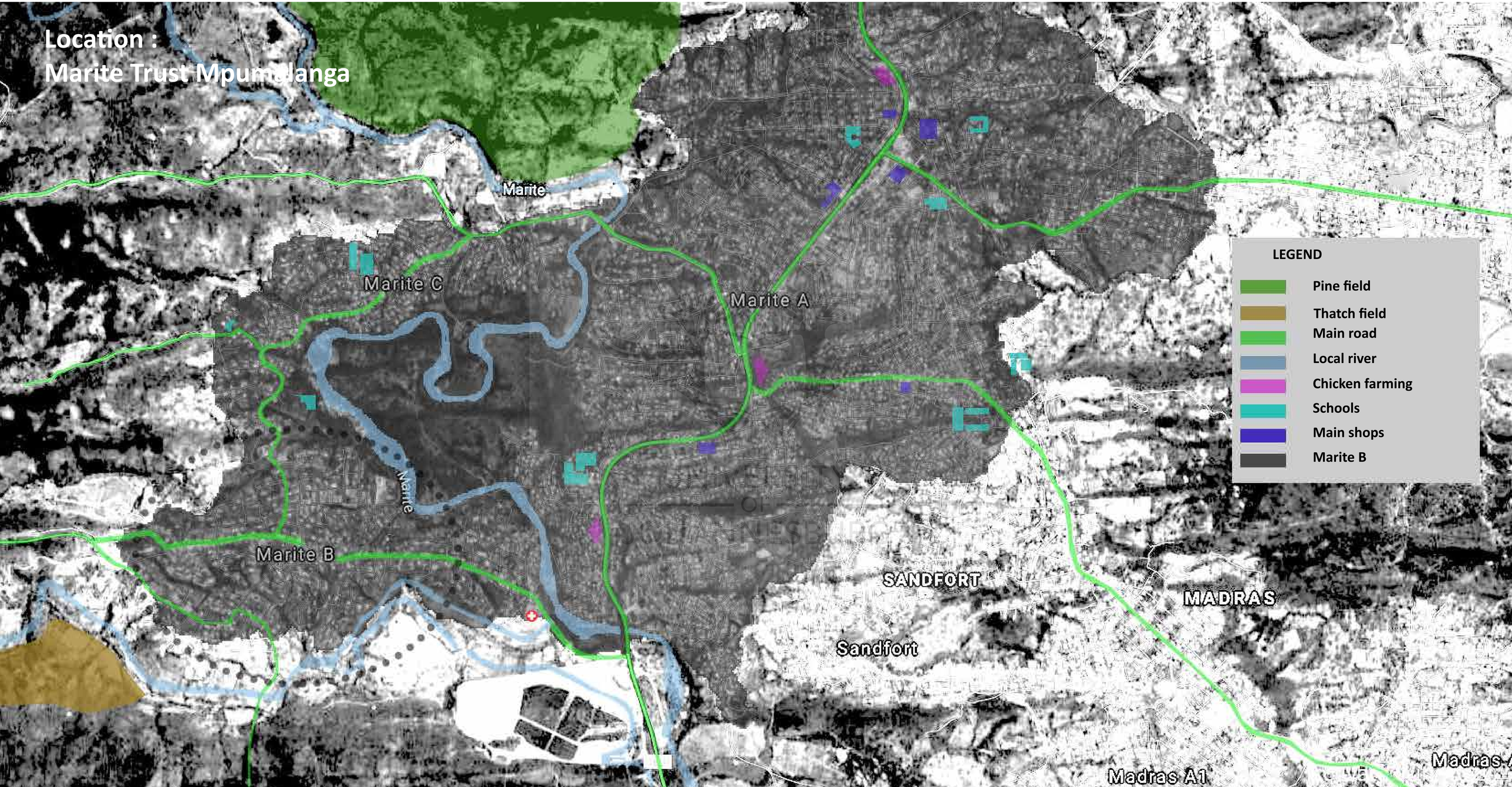
Bhuti ngibone ipost yakho about ukwakha ngobulongwe, I know someone who owns a lot of cows.

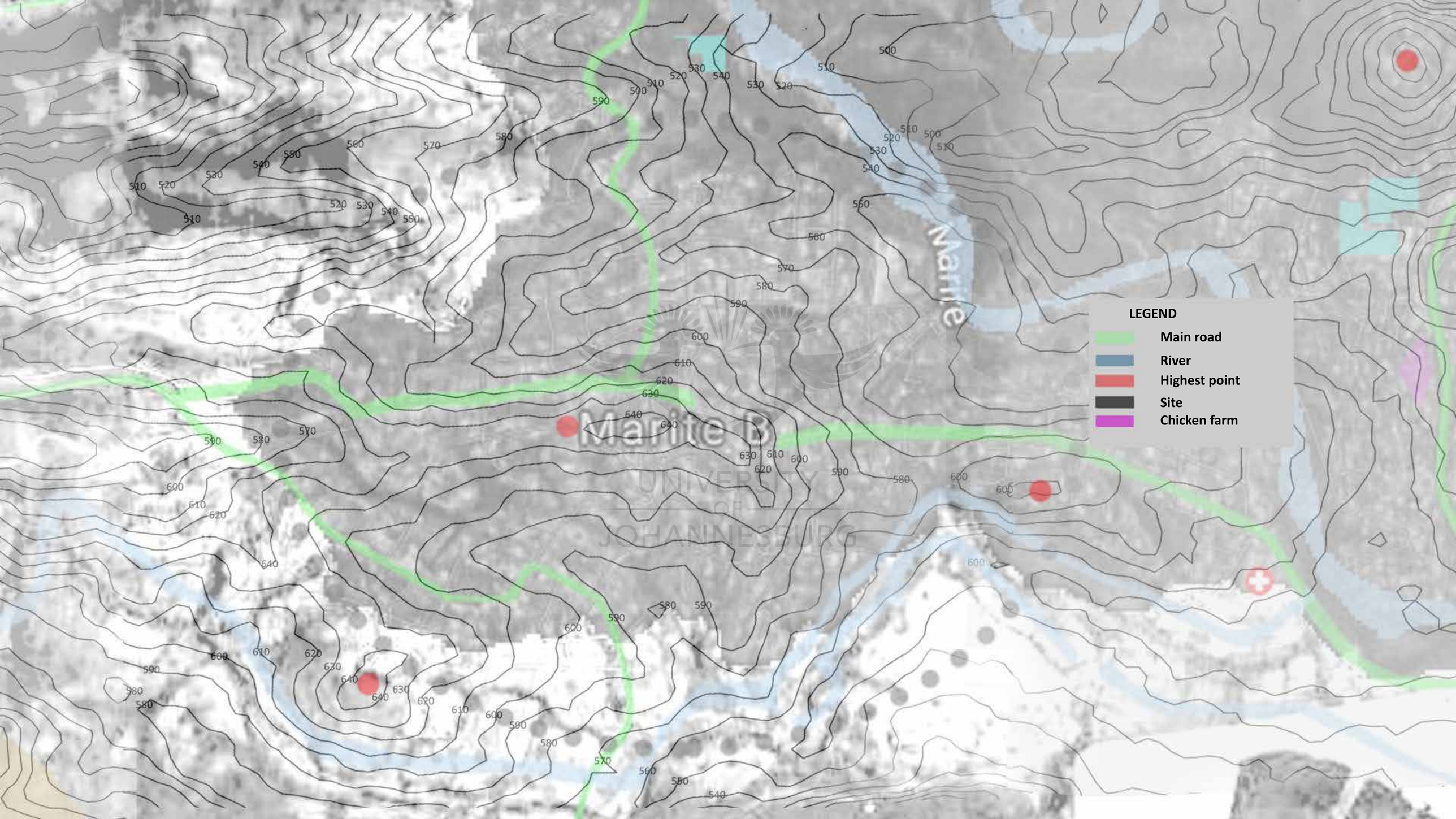
Awe. Thanks for getting in touch bro. Please send me your WhatsApp number so we can discuss it there.

Boitumelo Boity
Ishmael The-Ish Mashaba My grandfather and father have cows.. So anytime i can hook you up with them.. You let me know.. Xoxo
4 d Like Reply

Ishmael The-Ish Mashaba
most definitely, I will inbox you. Thanks ey!
3 d Like Reply

Location :
Marite Trust Mpumalanga


Location :
Marite Trust Mpumalanga
Marite
Marite C
Marite A
Marite
Marite B
SANDFORT
Sandfort
MADRAS
Madras A1
LEGEND
Pine field
Thatch field
Main road
Local river
Chicken farming
Schools
Main shops
Marite B


LEGEND
Main road
River
Highest point
Site
Chicken farm
Marite B
Marite
UNIVERSITY OF JOHANNESBURG

Marite Trust

It has a sloppy landscape because mpumalanga is known for its giant mountains and vegetations of natural landscape filled with rocks and many other cliff resources.

Water collection

People are still going through the difficulty of going to the nearest river/dam to collect water for cooking or building purposes.

Street View

The area dominates with mostly dusty roads because of the governments poor service of delivery.

Traditional house's and cattle farming

They build most of their houses using traditional building techniques by using the most common available materials.

Crops Farming

This practice is the villages source of income and also for food.

INTERVIEW

Community building with mud and cow dung

INTERVIEWER : Michael Mashaba
INTERVIEWEE : Ednar Mgiba
LOCATION : Marite Trust Village Mpumalanga
LANGUAGE : Siswati, Tsonga and English
DATE : 10 April 2020

This interview between Michael and Ednar will unpack the necessary information about community building using mud, cow dung and wood. It will focus mainly on the ritual aspect of the traditional culture that takes space from the begigning of the building. It will unfold the technical aspects

Dialog Interview

Michael : Who taught you how to build with cow dung?

Ednar : My parents taught me how to build from a very young age

Michael : How many people are required to build a house?

Ednar : Its a community initiative therefore as many people we can get.

Michael : Do you only build private houses or public building?

Ednar : It depends on the cultural region where one's based, we only build residential from my community.

Michael : What are the traditional rituals before building a house?

Ednar : The are many believes concerning this case, we normally have to use the African traditional beer to spill it on the ground from every edges of the stand for blessing from the ancestors.

Michael : Who gives consent to the ownership of the stand?

Ednar : The eldest in the family has to slaughter a goat and provide a few gifts to the chief of the community for the go ahead.

Michael : What are the relationships between the people who help build the house with you?

Ednar : Majority of the people are family, neighbors, friends and even strangers it becomes a gathering during this time.

TECHNICALITY

Steps of building mud house and plaster with dung

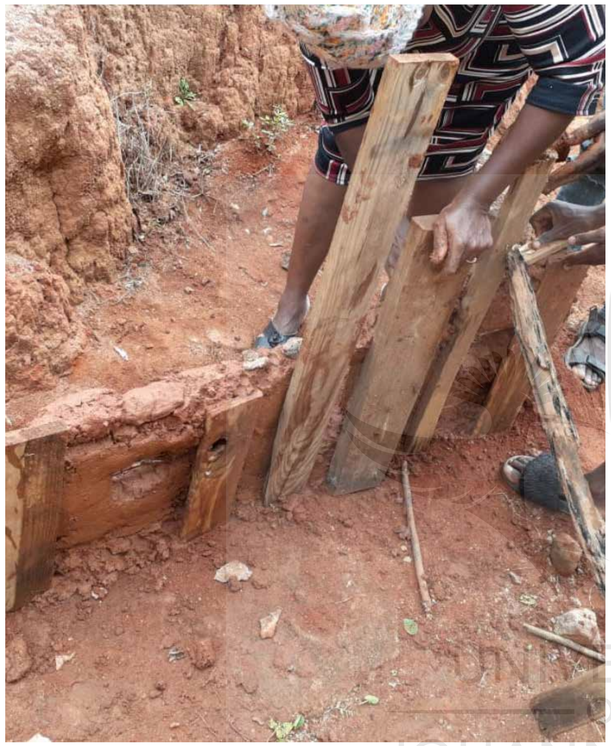
STEP 1
The making of the block
They use sand and water for the blocks. Females are mostly the ones who uses their feet to stamp on the mud untill.

STEP 2
She rolls the mud on the floor to form a cylinder/rectangular block shape of a brick to form the bricks. She continuously deep her hands into a bucket filled with water to prevent the wet mud from sticking onto her hands.

STEP 3
Digging tools are used to dig a foundation hole to begin with the structure from the ground.

STEP 4
Rocks are used at the base of the foundation as it helps to strengthen the structure from the base.

STEP 5
Door detail.
This part of the stage is very important because without the planks or tree branches on the sides to create door, nothing will work without this wood therefore it is



STEP 6
Formwork
Any types of tree branches are used as part of the shuttering but planks work better.

STEP 7
Cow dung plastering
This part of the building process has to be done by an experienced elder because if the ratio of mixing the water with dung isn't
correct, the dung will not stick prop-

STEP 8
Flooring
Cow dung is also used for flooring as an ancient traditional screed for the indoor and outside floor surface of the house.

INTERVIEW

About cows

INTERVIEWER : Michael Mashaba
INTERVIEWEE : Phineas
LOCATION : Marite Trust Village Mpumalanga
LANGUAGE : Siswati, Tsonga and English
DATE : 11 April 2020

This interview between Michael and Phineas will unfold the necessary information about keeping cows healthy and alive. It will also reveal the impact of eating too much grass or less for cows and the difference between a fully grow bull or a calves dung because has a huge impact in terms of how the dung can last without drying out.

Dialog Interview

Michael : How many cows do you own?

Phineas : 18 Cows

Michael : How long does each cow eat per day?

Phineas : 8hours a day.

Michael : What types of plants or grass do they eat?

Phineas : They eat according to their nature, I do not feed them but mostly any natural greeneries.

Michael : How many times does each cow produce the dung?

Ednar : It depends on how much it ate but normally it can release 5 times a day, 3.5kgX5 = 17.5KG per cow, a daily.

Michael : What is the difference between a bulls dung compared to a calves dung?

Phineas : The bulls dung contains alot of grass
The calves dung contains less grass but with milk within.

Michael : Do you sell the dung or give it away?

Phineas : Normally, I do not sell it. Whoever asks, I do give them but I sometimes charge R200 per bakkie load.

INTERVIEW

Elsie Mokoena mud house

INTERVIEWER : Michael Mashaba
INTERVIEWEE : Elsie Mokoena
LOCATION : Marite Trust Village Mpumalanga
LANGUAGE : Siswati, Tsonga and English
DATE : 3 August 2020

This interview between Michael and Elsie will unpack the necessary information about community building using mud, sticks, and thatch. It will focus mainly on the ritual aspect of the traditional culture that takes space from the begigning of the building. It will unfold the technical aspects as well.

Dialog Interview

Michael : Are you comfortable with me showing your face on the recording of the video?

Elsie : Yes, its okay.

Michael : Have you done an interview like this before?

Elsie : No, its my first time.

Michael : Are your parents and siblings still alive?

Elsie : No, they passed way when I was a teenager.

Michael : How many children do you have?

Elsie : 7 and 10 grand children.

Michael : Who taught you how to build with stones?

Elsie : From childhood everyone is expected to participate in communal building it became part of our tradition to learn from elders around the area when such takes place but I was taught by my aunty

Michael : How many people are required to build a house?

Elsie : It normally depends on fast is the house required to be finished, it would need a few people from 5 upwards but as this became our tradition of helping one another we build the houses with close to 10 - 15 people.

Ku Bhama - **Interlocking Technique**

Slanted tree branch used as rafter at about 45 degrees to 60 degrees

Horizontal tree branches used as battens for the roof.

Dried thatch collected from the nearest forest to be used as roofing.

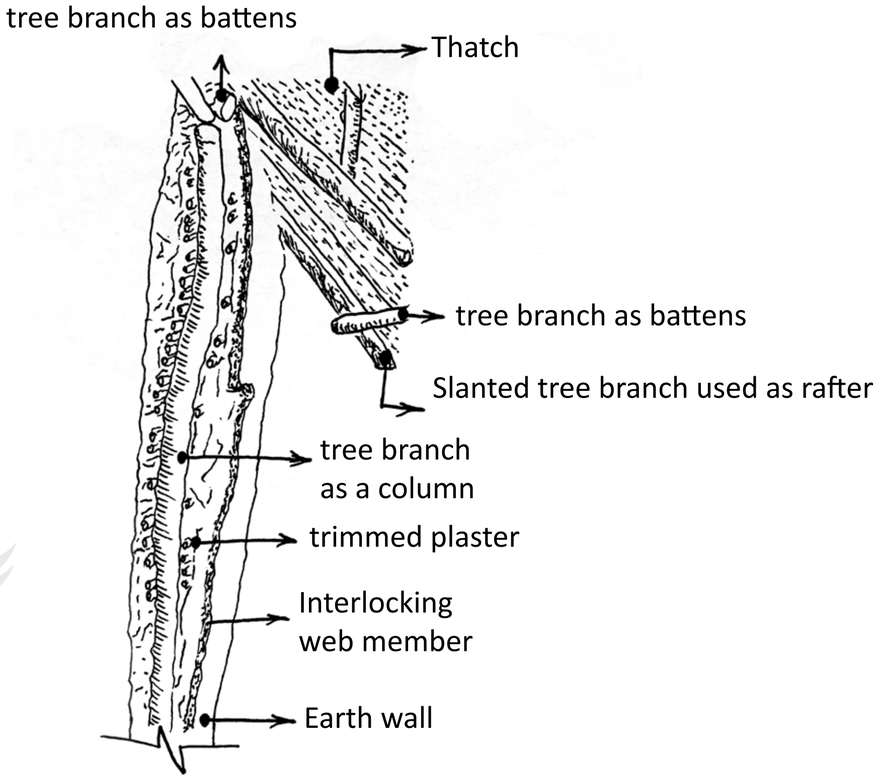
Interlocking horizontal web member, crossing over than beneath.

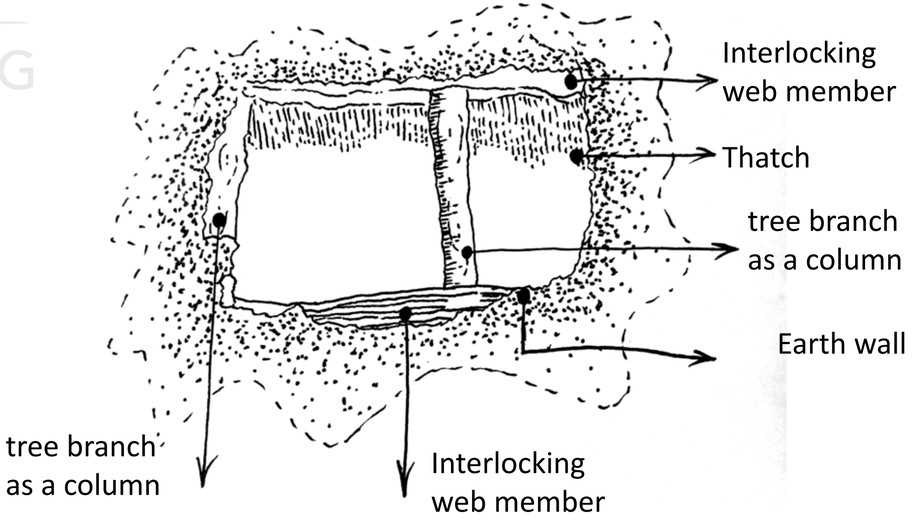
Dried earth - Found at the nearest wetland.

Interlocking horizontal member, moving across.

Vertical main supporting structure being dug from the ground. supporting the wall and the roof.

Drawing analysis





Reverse Engineering

Scale - 1:10

STEP 1:
Collect earth

STEP 2:
Use a containable to store the earth

STEP 3:
Cut 200mm long tree branches
12mm thickness

STEP 4:
Cut them into different sizes

STEP 5:
Measure them individually to the same exact sizes

STEP 6:
Use a suitable cutting equipment

STEP 7:
Break it apart

STEP 8:

STEP 9:

STEP 10:

STEP 11:

STEP 12:

STEP 13:

STEP 14:

STEP 15:

STEP 16:

STEP 17:

STEP 18:

STEP 19:

STEP 20:

STEP 21:

STEP 22:

STEP 23:

STEP 24:

STEP 25:

STEP 26:

STEP 27:

STEP 28:

STEP 29:

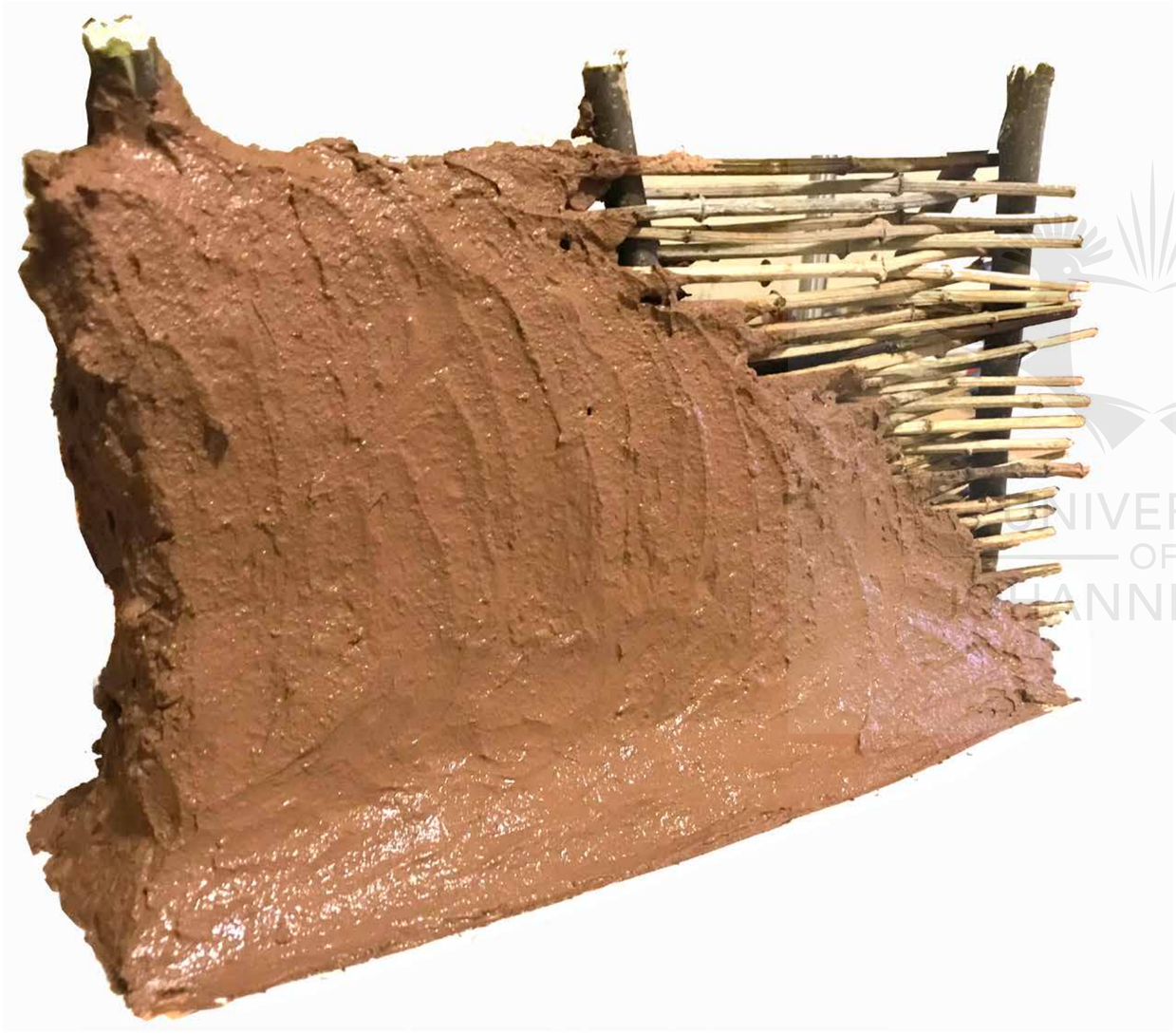
STEP 30:

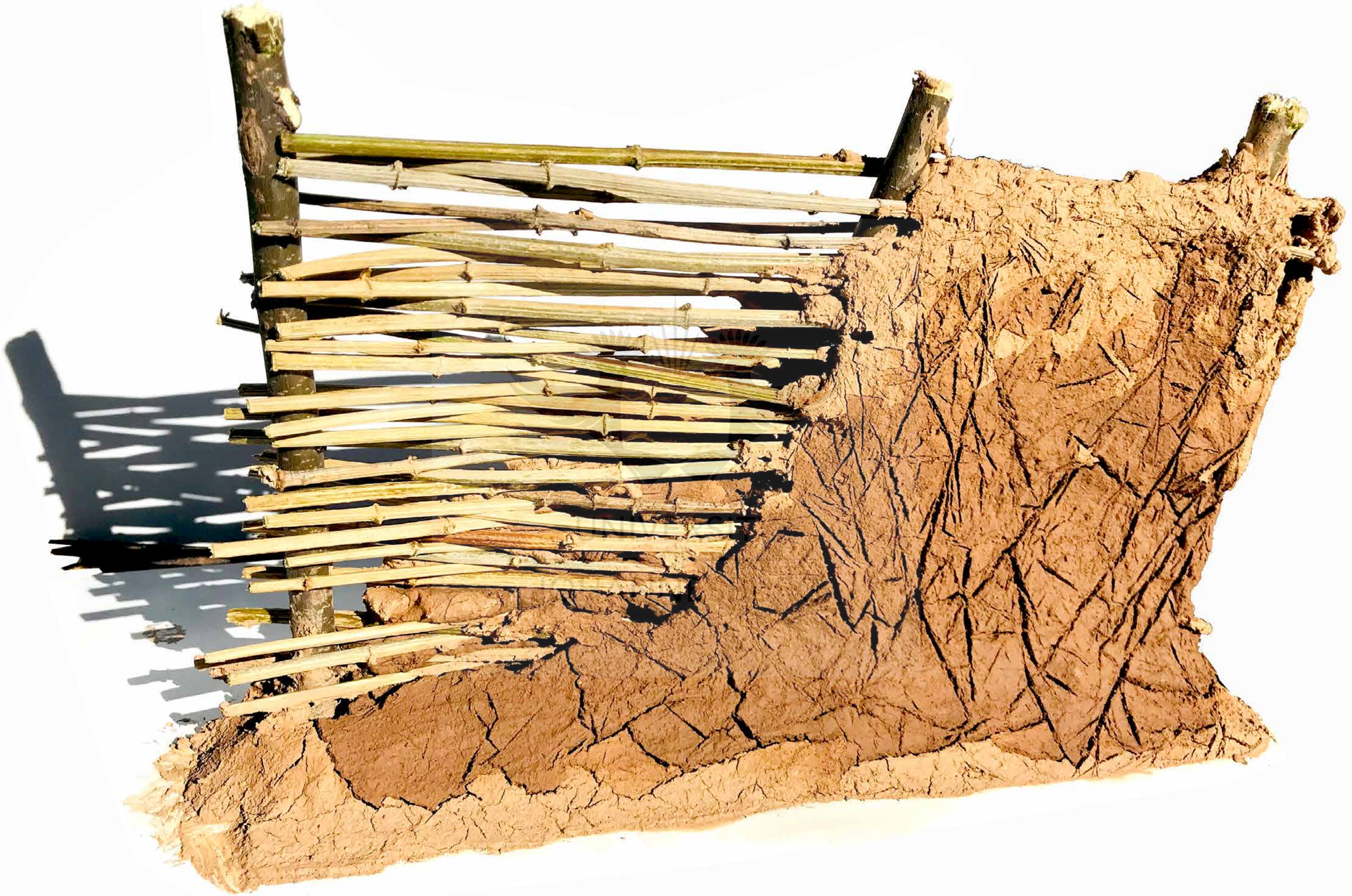
STEP 31:

STEP 32:

Earth + Branches

Scale - 1:10



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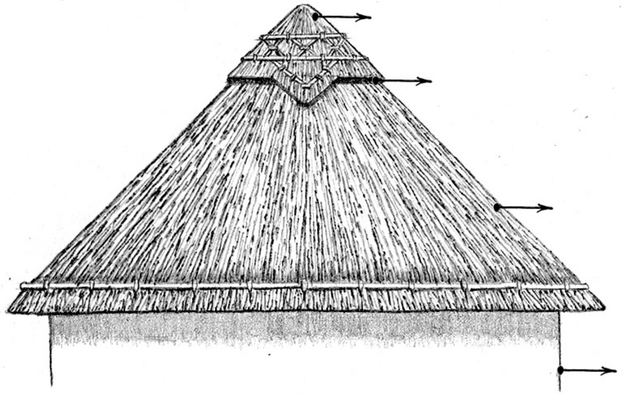
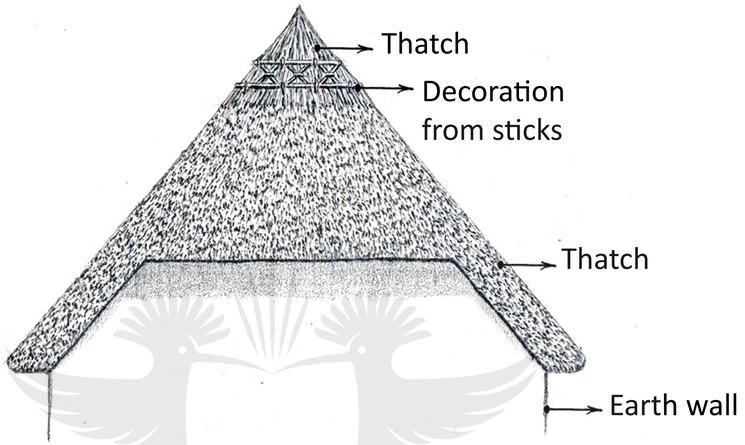
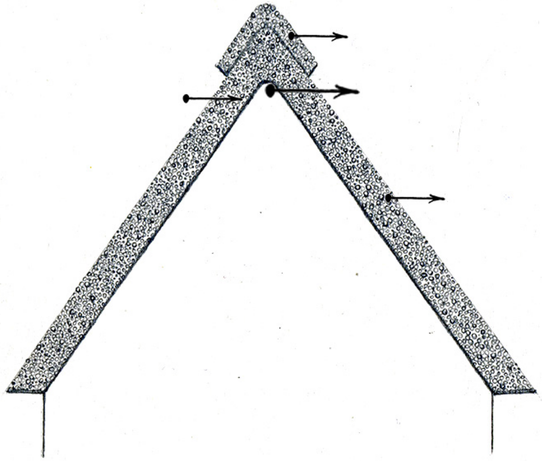
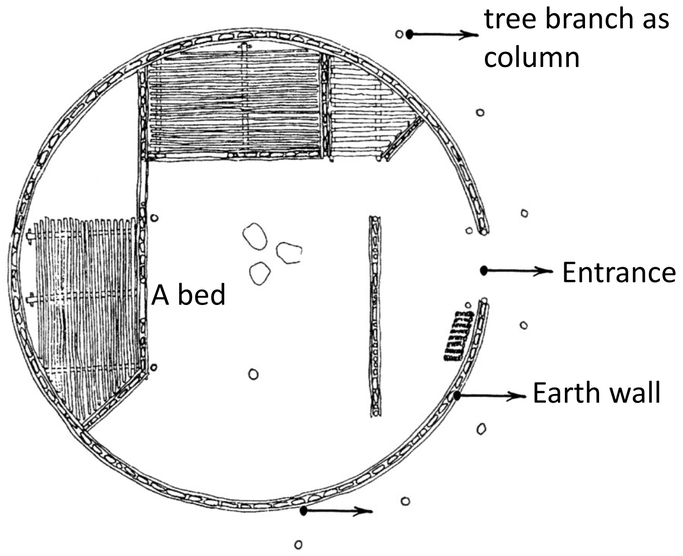




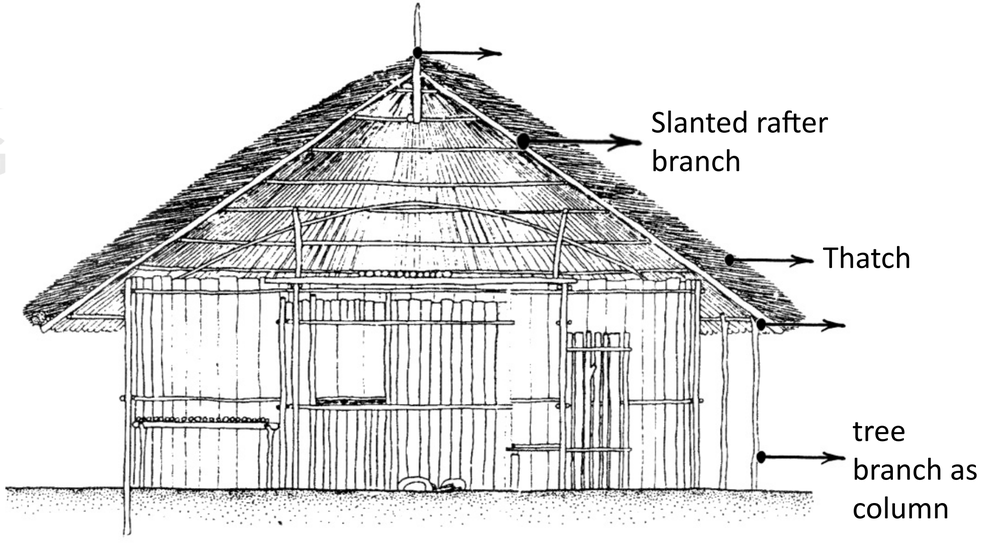




Brief Overview

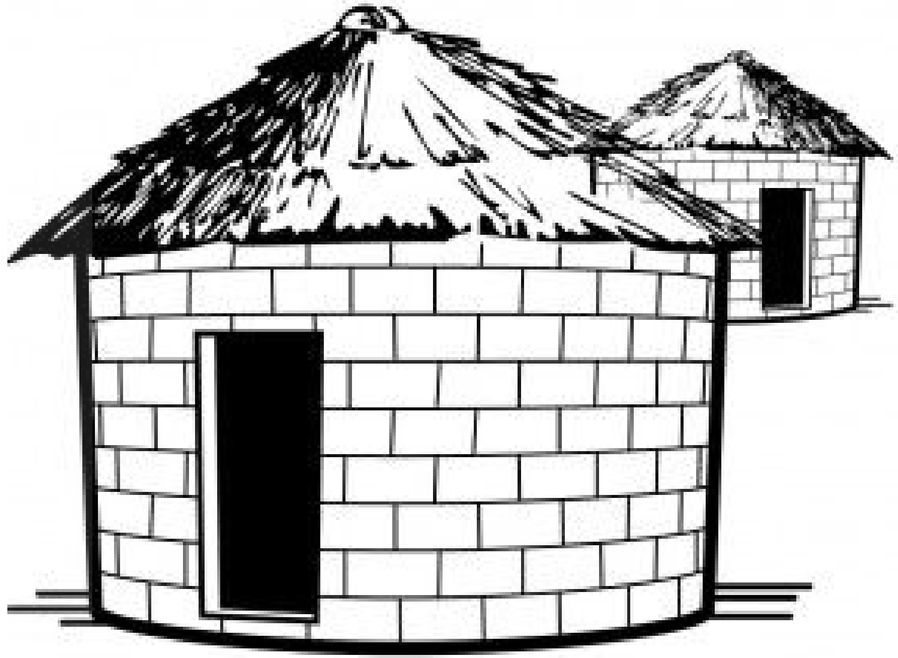
This medium size Zulu hut is a replica of the huts built during the reconstruction of a section of the Royal Capital of Umgungundlovu during the 1980's. King Dingane had the capital constructed during his reign. The hut is typical of the dwellings found in the then Zululand, which were traditionally constructed by men.

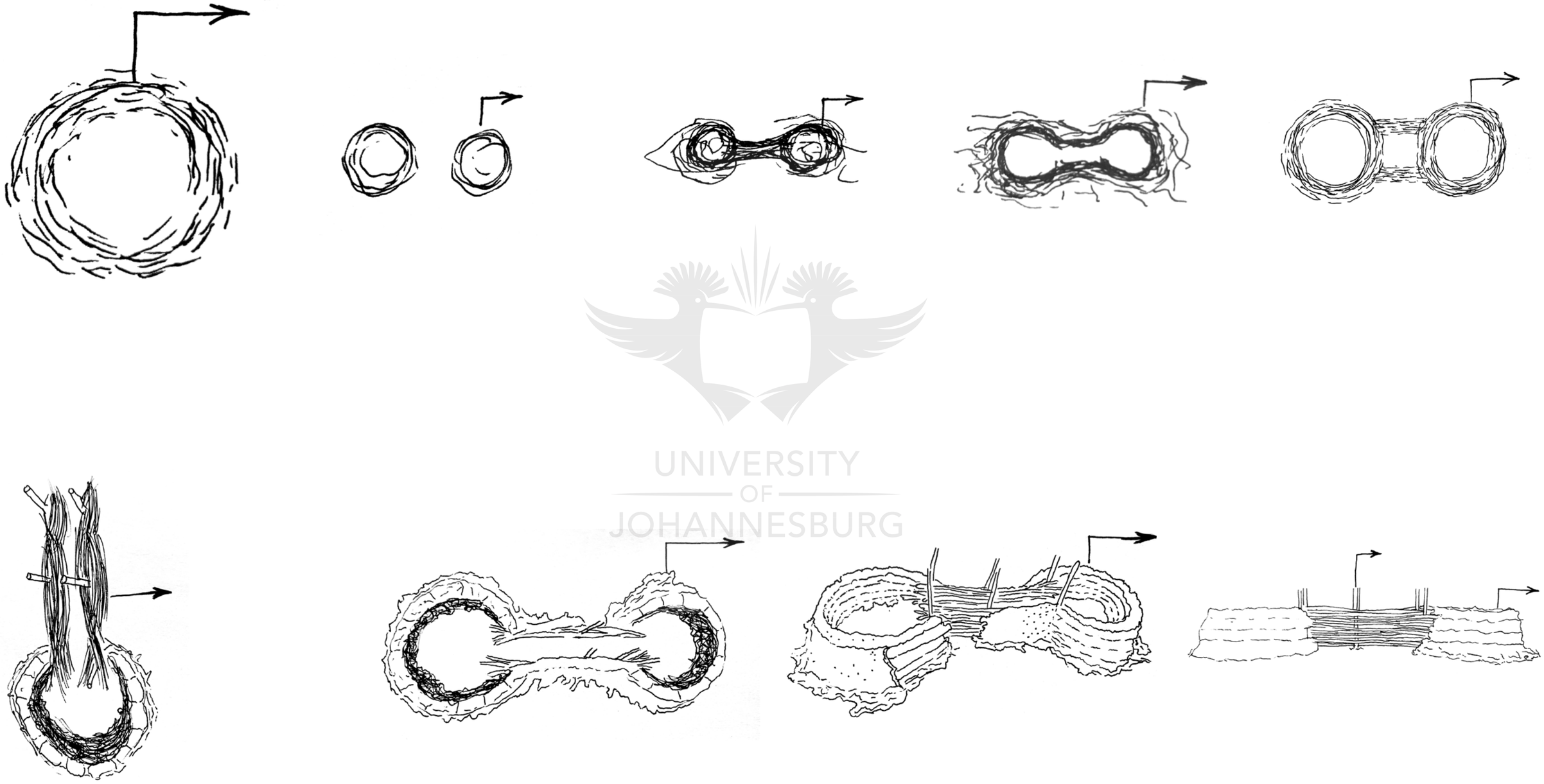
Characteristic of the traditional indlu (hut) is its beehive-style construction. The frame of the hut is made of sapling poles placed in a circle, bent inwards and lashed together. After the frame is complete, it is thatched with grass. The floor of the hut is made from a mixture of anthill clay and cow-dung.



Merging technique

Scale - 1:20





STEP 1:

STEP 2:

STEP 3:

STEP 4:

STEP 5:

STEP 6:

STEP 7:

STEP 8:

STEP 9:

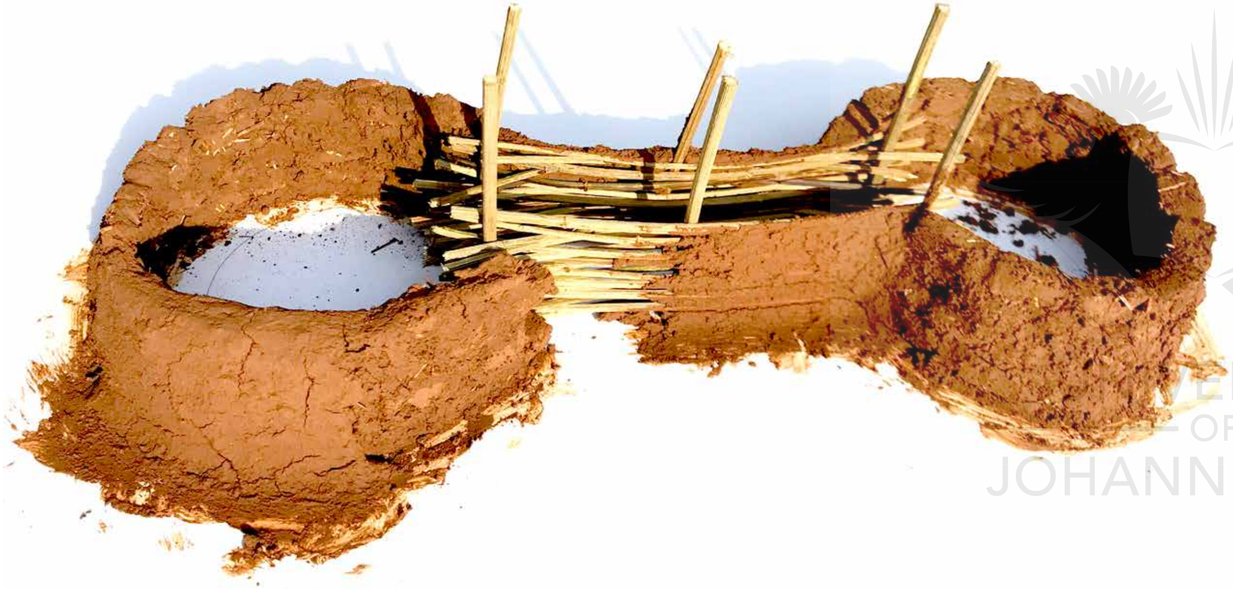
STEP 10:

STEP 11:

STEP 12:

Merging technique

Scale - 1:20



Elizabeth Khoza stone house

INTERVIEWER : Michael Mashaba
INTERVIEWEE : Elizabeth Khoza
LOCATION : Marite Trust Village Mpumalanga
LANGUAGE : Siswati, Tsonga and English
DATE : 3 August 2020

This interview between Michael and Elizabeth will unpack the necessary information about community building using stones, earth, cement and wood. It will focus mainly on the personal part of Elizabeth as an individual from her personal living to how she participated in communal building from her community.

Dialog Interview

Michael : Are you comfortable with me showing your face on the recording of the video?

Elizabeth : Yes, its okay.

Michael : Have you done an interview like this before?

Elizabeth : No, its my first time.

Michael : Are your parents and siblings still alive?

Elizabeth : No, they passed way, there's only me and my siblings left.

Michael : How are the living conditions around the area?

Elizabeth : It is a very quiet place with good living conditions but there's a huge lack of infrastructure because out government is failing us with service delivery.

Michael : What types of houses do you build?

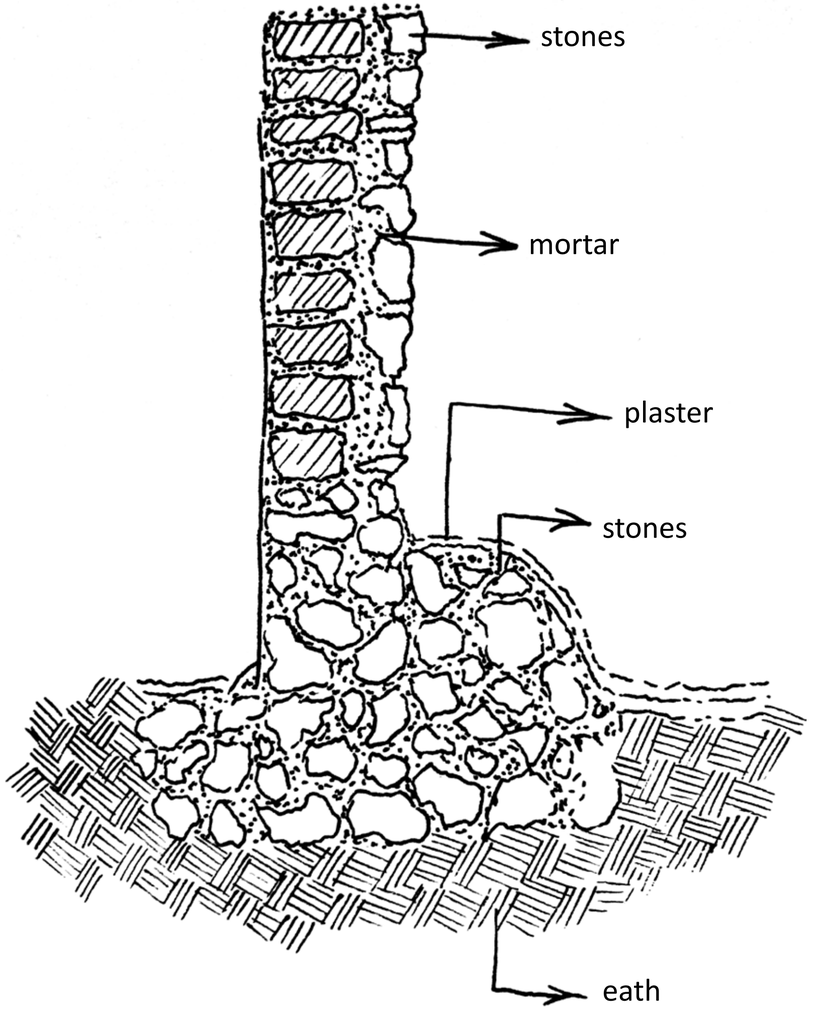
Elizabeth : We build many different types it depends on what the neighbours we are helping prefer, but normally we build stone houses, built with earth block from the inside then using the stones as the cladding for decoration.

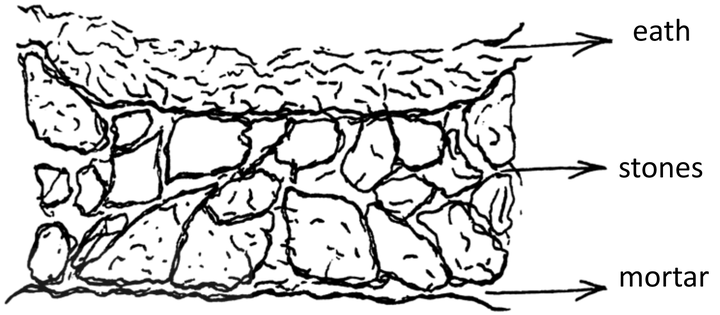
Michael : Do you build only private or public houses?

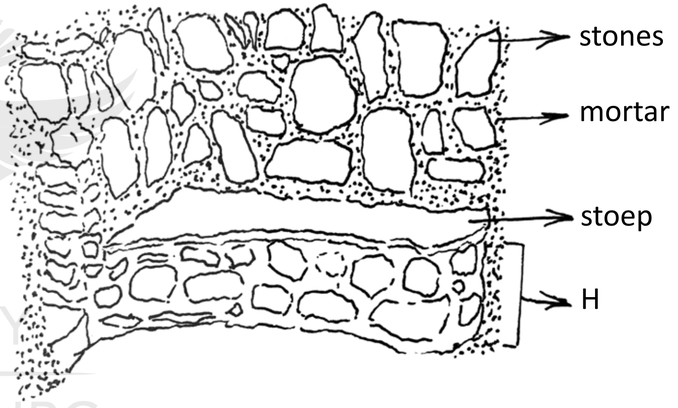
Elizabeth : Normally we do private most of the time because the public houses needs alot of people almost the whole community.

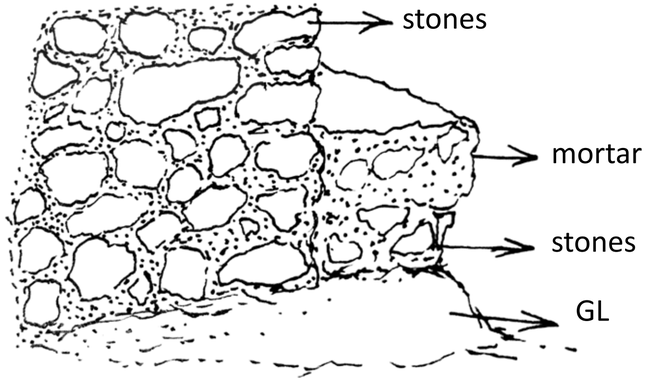
Building with earth and covering with rocks

Detail sketches





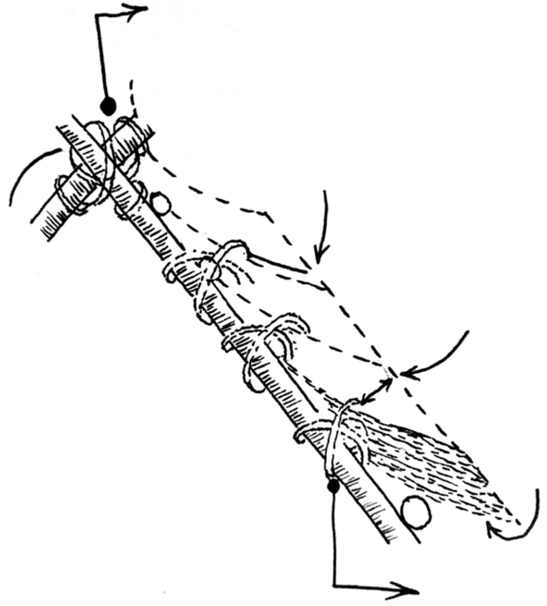




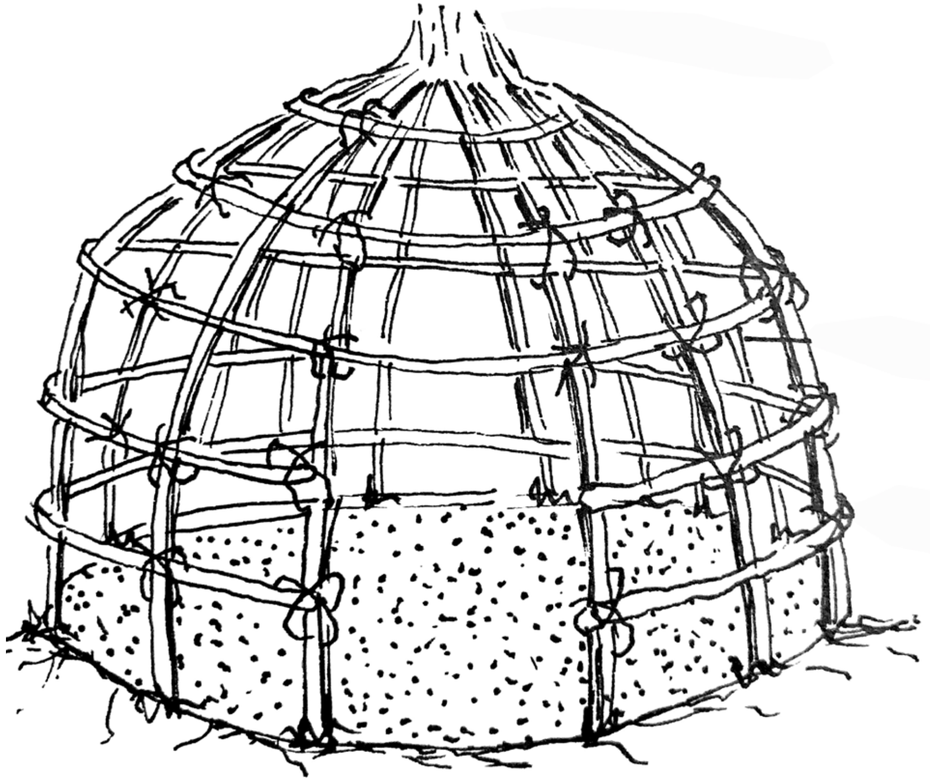
Sisal rope - locally made

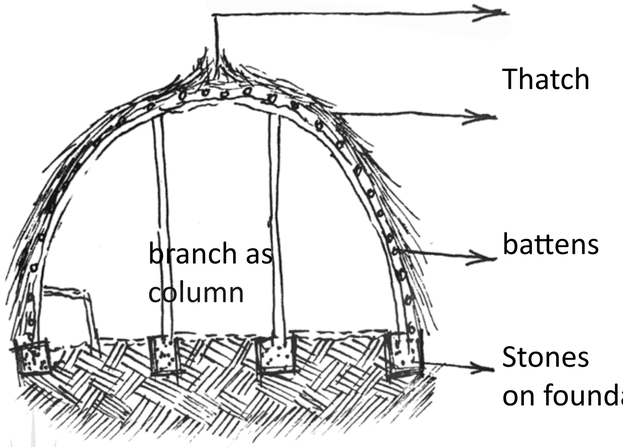
A brief overview of how the ropes are made. from locally available sisal plant, to use different types of techniques to twist and braid it to make it stronger.

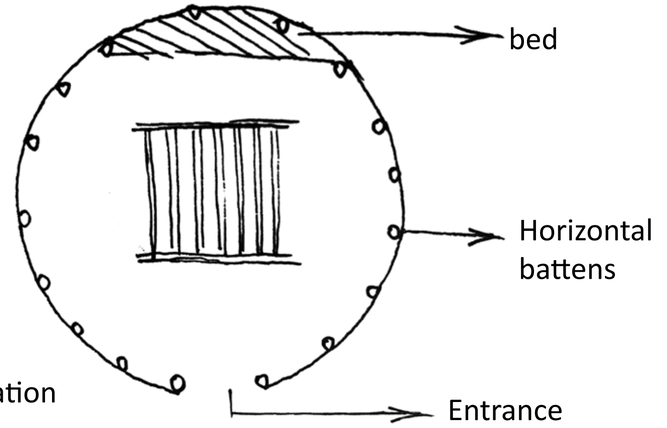
A Section showing how and what the ropes are used for on their built enviroment

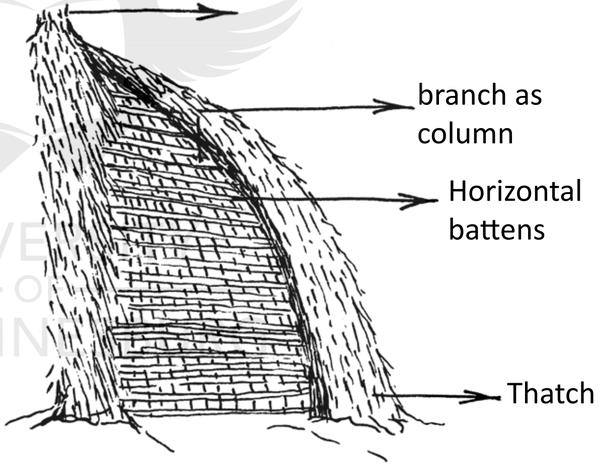


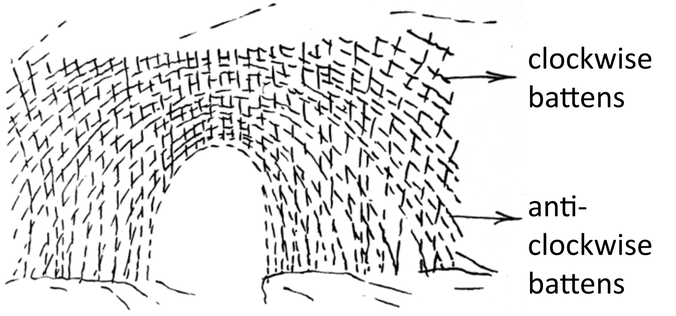
Detail sketches

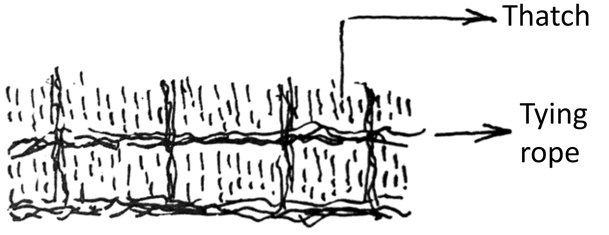








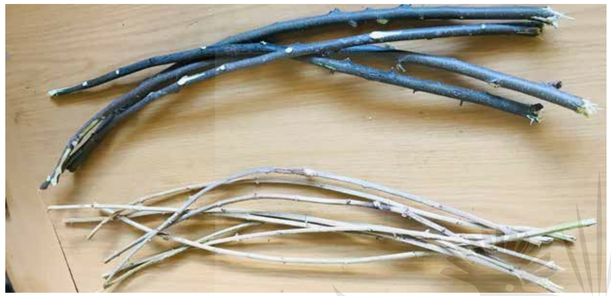




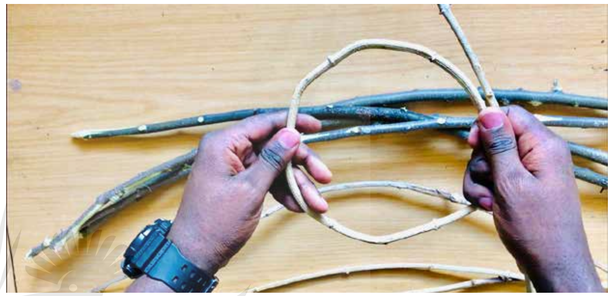
Reverse Engineering

Scale - 1:10

STEP 1:
Collect thatch



STEP 2:
Cut them to the same size



STEP 3:
Bend to circular shape

STEP 4:
Bend to create an arch shape

STEP 5:
Create holes

STEP 6:
Insert the branches into the holes made

STEP 7:
Create a midpoint for all brances

STEP 8:

STEP 9:

STEP 10:

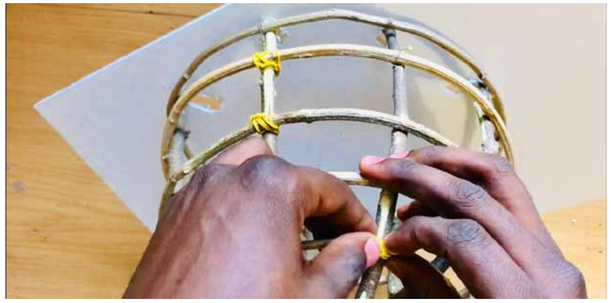
STEP 11:

STEP 12:

STEP 13:

STEP 14:

STEP 15:



STEP 16:

STEP 17:

STEP 18:

STEP 19:

STEP 20:

STEP 21:

STEP 22:

STEP 23:

STEP 24:

STEP 25:

STEP 26:

STEP 27:

STEP 28:

STEP 29:

STEP 30:

STEP 31:

STEP 32:

Thatch + Branches

Scale - 1:10

A NATURAL BINDER AND DETACHER

BACKGROUND

Cow dung

What is cow dung?

Is the waste product of bovine animal species. Cow dung is the undigested residue of plant matter which has passed through the animal's gut. The resultant faecal matter is rich in minerals. The colour ranges from greenish to blackish, often darkening soon after exposure to air.

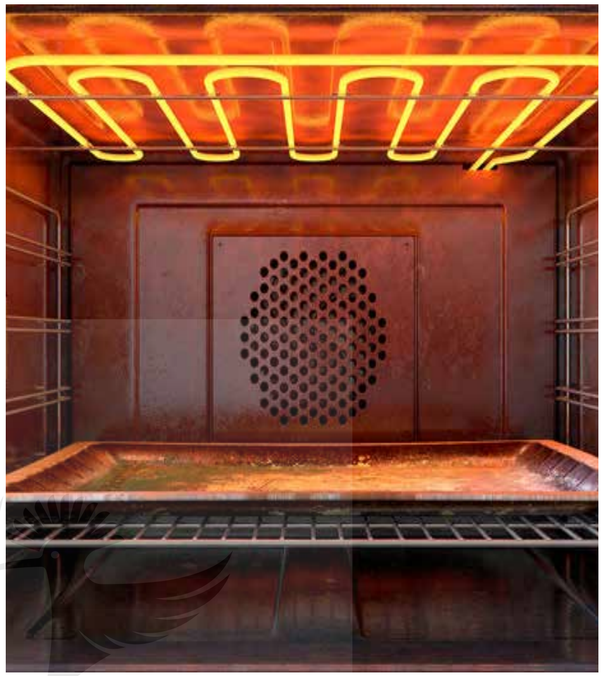
Cow dung has been useful for generations after generations. India is one of the common known places to push cow dung too its limitation in terms of creating new products from it.

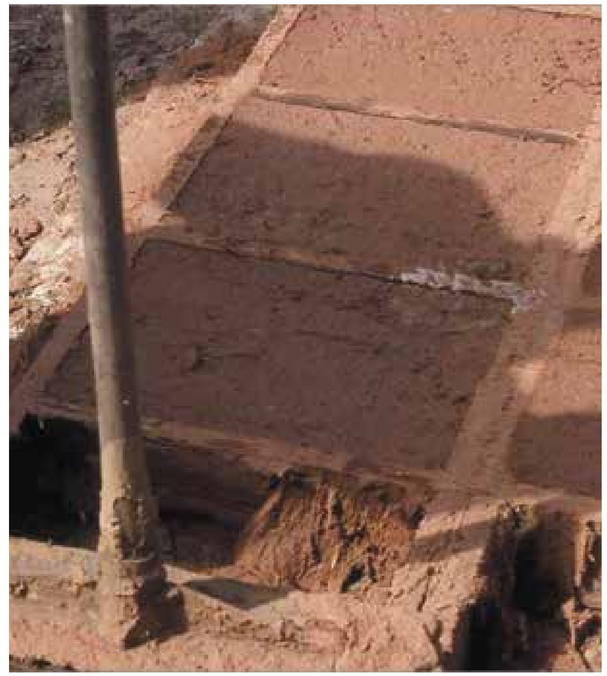
Italians have created ceramics from clay and cow dung which shows the potential of this waste.
In the African continent it has been used for household purposes like flooring and plaster for their walls. It is commonly used for manure for farmers as it is healthy for crops and other Fungi's running through the soil.

It has its weakness and strength like any other material. It is able to bind fibres to create a new system within it. It is known for its urine bad smell but the urine can be drained or allow the dung to dry out from the sun which will give it a new fresh, healthy and clean smell.

Innovating Cow dung

The aim of this experiment is to further investigate the potential outcome of dried cow dung that has been mixed with different types of non toxic material as listed below. To also find out about the possible stages that can be taken after the dried object, if can it be we polished to created a smoother surface? can it be glazed? can it be made stronger by the adding of resin and natural adhesives? I will also propose to add a woven reinforcement onto one of my experiment to test and see how that reacts. I will also unfold the reactions of its moisture when drying during the process.





List of material

Cow dung
Resin
Water
blood

Woven grass/leafs
Sand
Clay
Soil

Processes

Room temperature dry
Oven heat
Burn with coal
Soak/drench

A mixer
Glazed
Polish
Roughen

Time frame

60 C at 48hours _ Oven heat
3-4days _ room temperature

Testing waterproofing

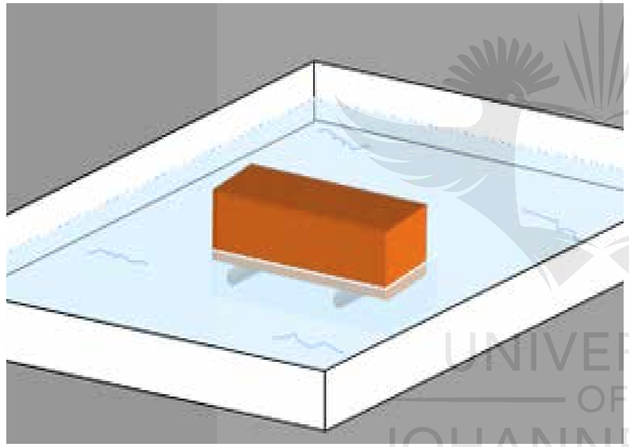
STEP 1 - There are many ways to test for waterproofing. In particular of my experiments I propose to soak or drench the end product of my object into 200mm bowl filled with water.

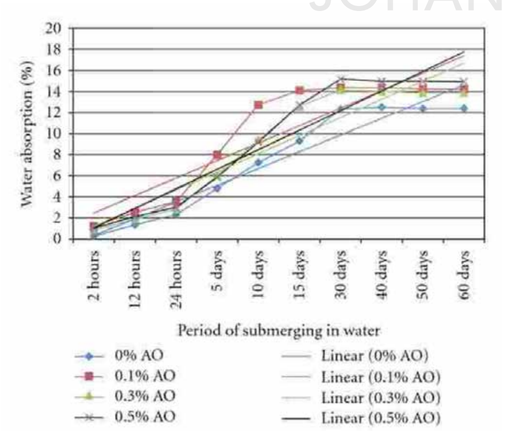
STEP 2 - I will take the reading of the time from speed seconds, seconds, minutes, hours and days depending on the material.

STEP 3 - I will use the time readings to complete a graph that will represent my findings from this waterproofing experiment.

STEP 4 - I will use a laser cut to cut off 20% of the block to see and take the readings of how far did the water get absorbed into the block. i.e.: was the block completely soaked and wet through the inside? How long does it take to get dried up again after being wet for a few hours or days.

STEP 5 - I will make my final readings with a conclusion.





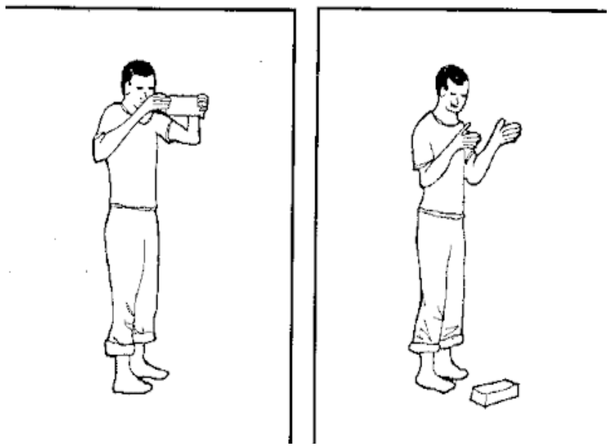
Testing strength

STEP 1 - I will compare two blocks. One will be dried from room temperature and the other will be dried by an oven.

STEP 2 - I will place the block into an oven while I take the time readings to its reaction to the heat. If after how long did it break? or does it even break at all? I will do the same for the other block.

STEP 3 - After being burnt in the oven and dried by the sun, I will place it under a crushing steel strength testing machine. I will be taking the readings of the deflection height, and the time of the block while its being crushed.

STEP 4 - I will make a conclusion comparing the two blocks that dried from different Systems but make from the same exact material.



Materials to be mixed

Testing waterproofing

Innovating cow dung

Cow dung mixed with grass.

MATERIAL DATA

Water	Cow dung	Grass
30ml	595g	5g

INSTRUCTIONS

- Create a mould
- Add the grass and mix with the cow dung before adding water because this helps to figure out how much
water you need

OBSERVATION

The more water you add, the weaker the cow dung. The less water you add the stronger and faster it takes to dry and hardens
This experiment was dried using an industrial baking oven. It failed to keep its shape because it had no mould.

RATIO -

Thickness variaties

MATERIAL DATA

Water	Cow dung	Grass
30ml	595g	5g

INSTRUCTIONS

- Create a a rectangular thin mould
- Add the grass slowly while you mix
- Mix untill its smooth
- Cast into the mould and let it dry.

Observation

At this moment I wanted to observe the difference as the block is much thinner. It seem to have some cracks during the process but it cured and some of the cracks disapeared which was caused by the grass inside to pull the cow dung closer together to make it stronger.

RATIO -

Cow dung mixed with powder.

MATERIAL DATA

Water	Cow dung	Gypsum powder

INSTRUCTIONS

- Create a mould
- Crush an existing dry wall and use the while powder.
- Add the powder slowly while mixing
- Cast into the mould and let it dry.

Observation

I added a crushed gypsum board powder which finely crushed this was to test weather can cow dung melt or crush the remaining solids of the powder during the mix but unfortunately NOT. The are remainders of the solid powders falling off during curing

RATIO -

Cow dung mixed with plaster sand.

MATERIAL DATA

Water	Cow dung	Plater sand
30ml	195g	5g

INSTRUCTIONS

- Create a mould
- Add water in the cow dung using a bowl
- Mix untill its smooth
- Cast into the mould and let it dry.

Observation

The dung successful to bind the plaster sand just like cement would but not as hard nor strong as cement.

RATIO -

Cow dung mixed with plaster sand and grass.

MATERIAL DATA




Water	Cow dung	Plaster sand	Grass
30ml	500g	5g	5g

INSTRUCTIONS

- Create a mould
- Add water in the cow dung using a bowl
- Mix untill its smooth
- Cast into the mould and let it dry.

Observation

This experiment is different because it has grass added into the mixture to observe if does this model get stronger or weaker compaed to the previous model without the grass.

RATIO -

Growing fungus on cow dung block

Results - It is still in process but the block is more stronger now,
the fungus did not disapaear after being placed in a non moist area, which proves that the fungus can still live and do its work without being in a moist environment. As soon as the fungus is visible it may be set to dry out naturally at room temperature, no sun needed.

DAY = 1

DAY = 7

DAY = 14

DAY = 21

DAY = 28

DAY = 35

COMMUNITY BUILDING

Francis Kere - Gando Primary School

The entire population of Gando took part in the construction of the school. Everybody wanted to help – women prepared the floor while the men pressed earth for the brick walls and collected stones for the foundation. but Kéré wanted to use locally available resources. Local material was used such as: Mud, Wood, Stones, Cement, Concrete, Water, Steel, Corrugated sheeting.
BUILDING TECHNIQUES Kere wanted to use traditional building methods

MALI

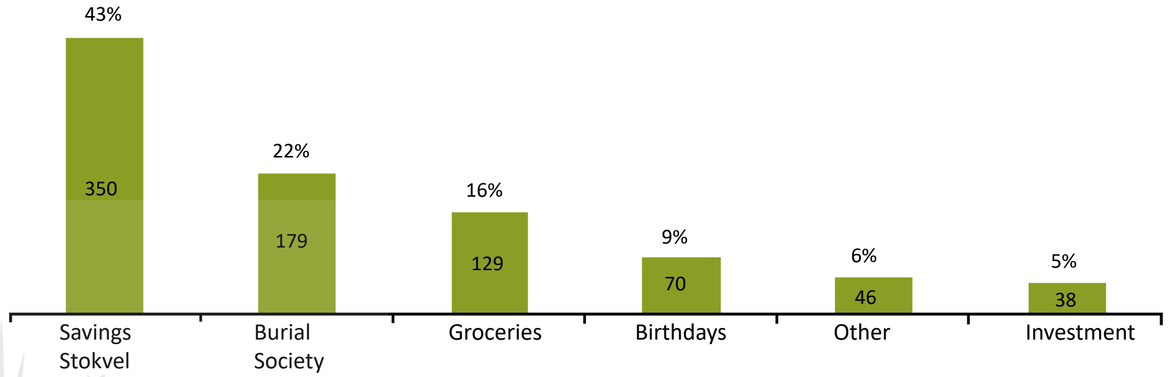
The Great Mosque of Djenne

The Great Mosque of Djenné is a large banco or adobe building that is considered by many architects to be one of the greatest achievements of the Sudano-Sahelian architectural style. The mosque is located in the city of Djenné, Mali, on the flood plain of the Bani River.

Stokvel as labour

What is a stokvel?

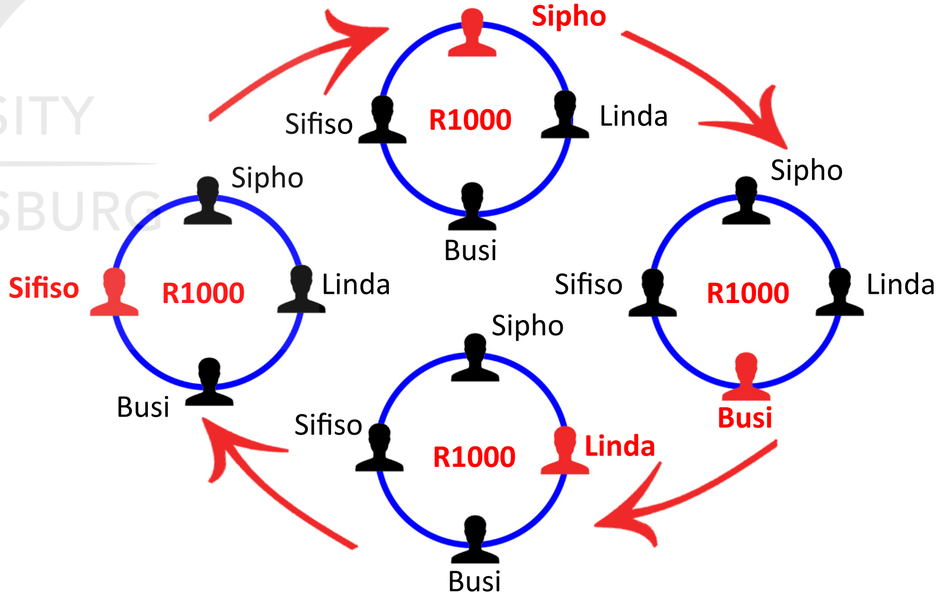
Stokvels are invitation-only clubs of twelve or more people serving as rotating credit unions or saving schemes in South Africa where members contribute fixed sums of money to a central fund on a weekly, fortnightly or monthly basis. The name **stokvel** originated from the term **stock fairs**, as the rotating cattle auctions of English settlers in the Eastern Cape during the early 19th century were known.
The project uses the concept of stokvel in the community for people to gather and bring their individual set of skills into the projeect. Building for every individual will be processed with the same idea of how a stokvel is used in communities.



Stokvels generally have a constitution which dictates the size of the contributions, when the accumulated money is to be paid out and the roles and responsibilities of the members. Each month a different member receives the money in the fund, which was collected during that period. Defaults on contribution are quite rare as other members will know if you haven't paid your contribution.

The below graph shows a general different types of stokvels in South African and its general estimated contributions p/m.

It is estimated that one in every two adult South Africans is a member of at least one of 800 000 stokvels. South Africans invest approximately R50 billion in stokvels a year.



Stokvel pros & cons

If one member of the stockvel doesn't fulfil their duty, the entire group may be affected brutally	It saves you money
Trust is very essential because once its broken everyone will suffer at the end.	It creates a community engagement forum
Its about the person next to you therefore its everyone responsibility to take care of one another	People create a tradition of supporting each other finacially
People who believe in savings-accounts at financial institutions, consider stokvels being nonsense	It comes with natural efford becuase nobody is forced to join
Some members can be advantaged more than others.	It enhances the quality of building ones life's
Payments can be insufficient to meet your needs	One learns more from different people
If a burial society is unable to provide enough cash for a burial, the family must pay for the funeral of a loved one out of their own pockets.	More options and ideas into the table, variety of information.
	Many people who joined stockvel benefit a lot financially
	It promotes a sense of Ubuntu within the community by bringing people together.

Stokvel as labour

Communal cake baking

The purpose of this experiment is to test the needed logistics behind community building. The proposal of baking a cake with 10 people will unfold how to go about to create and design a community building system based on my thesis question

Task:
The decorator

Task:
The assembly lady

Task:
The frost mixer partner_2

Task:
The Orchestrator

Task:
The cake designer_1

Task:
The Finance lady

Task:
The shopping guy

Task:
The time and temperature check and cooler monitor.W

Task:
The caramel mixer

Task:
The frost mixer

Shopping + recipe

Cake Recipe

INGREDIENTS INSTRUCTIONS

FOR THE CAKE:
2 3/4 cups all-purpose flour 330g
2 1/4 tsp baking powder 8g
1 1/2 tsp salt 5g
1 cup butter plus one tbsp, 240g room temp
1 1/2 cups sugar 300g
5 eggs
1 yolk
1 1/2 tbsp vanilla extract 22mL
1 1/2 cup milk 360mL
1 1/2 tbsp vinegar 22mL

FOR THE CAKE:

1 .Preheat oven to 350 degrees F. Butter and flour three 6 inch round pans. Whisk together the flour, baking powder and salt. Set aside.

NOTES

For the Caramel:
Don’t stir! After the sugar has dissolved you don’t need to stir as it can cause crystals to form and ruin that silky consistency. DO brush the side of the pot down with a wet pastry brush.

Ingredients + Tools

SUGAR

Type: White
Quantity: 2.5kg
Brand: Pick ‘n pay
Price: RR34.99

MILK

Type: Full cream
Quantity: 1L
Brand: Pick ‘n pay
Price: R12.99

EGGS

Type: Chicken
Quantity: 22
Brand: Pick ‘n pay
Price: R41.99

FLOUR

Type: Cake wheat
Quantity: 2.5kg
Brand: Snowflake
Price: R29.99

Margarine

Type: To bake
Quantity: 500kg
Brand: Stork
Price: R24.99

Chocolate mixer

Type: Cocoa
Quantity: 125g
Brand: Nestle
Price: R35.99

Cream

Type: Fresh cream
Quantity: 250ml
Brand: Dewfresh
Price: R19.99

name: Whisk machine

Purpose: Cream mixer
No of times used:
Brand:
Price: R

name: Wooden spoon

Purpose: To stir
No of times used:
Brand:
Price: R

name:

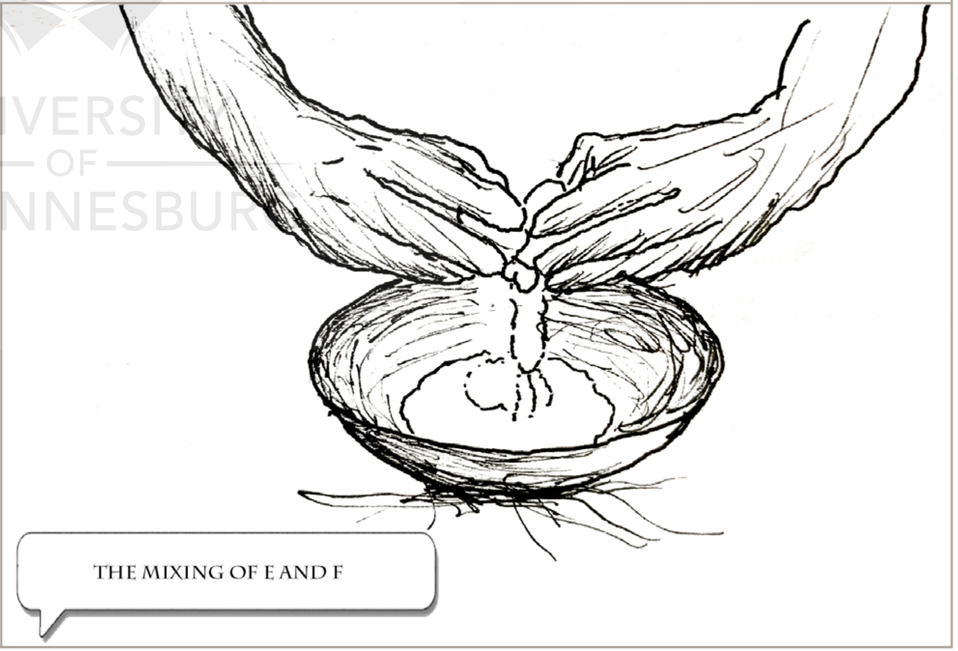
Purpose:
No of times used:
Brand:
Price: R

name: Baking pan

Purpose: Carry the daw
No of times used:
Brand:
Price: R

FRAME_1

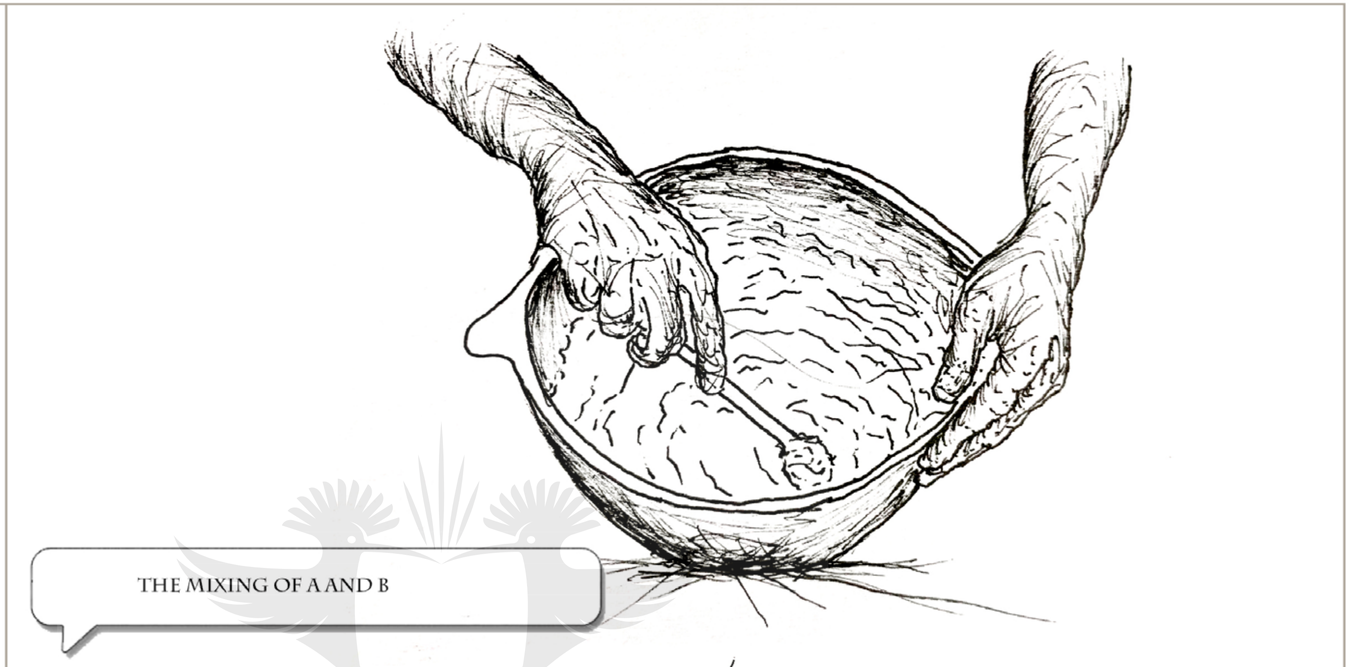
Everyone has a specific task to fullfill because this is a communal baking therefore everyone has to take part.This frame unfolds the instructions and the skills each individual will be participating on from the first analyses of which receipt to choose and why? How will write up and create the receipt of the cake.

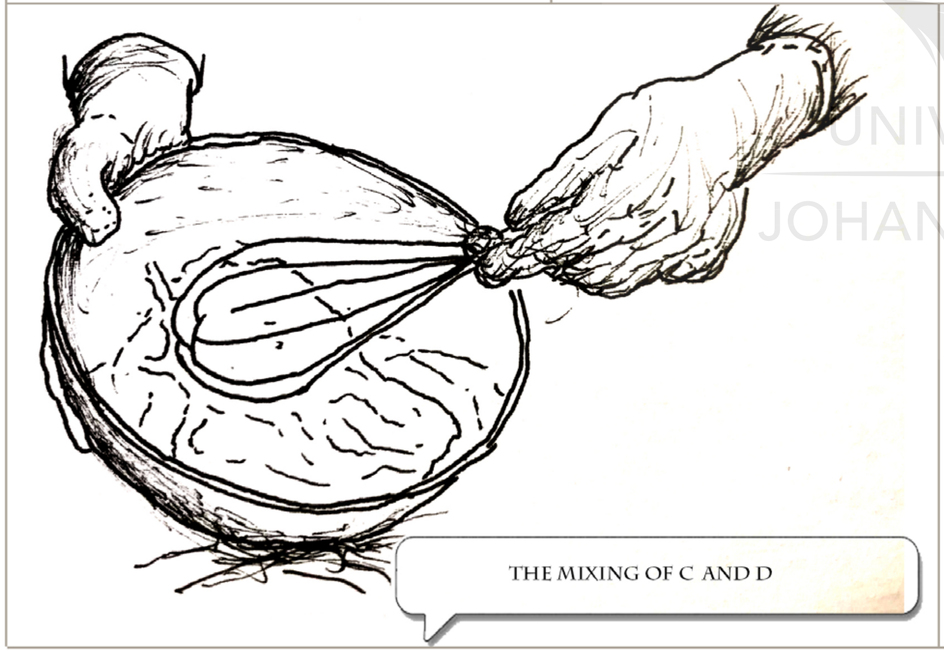


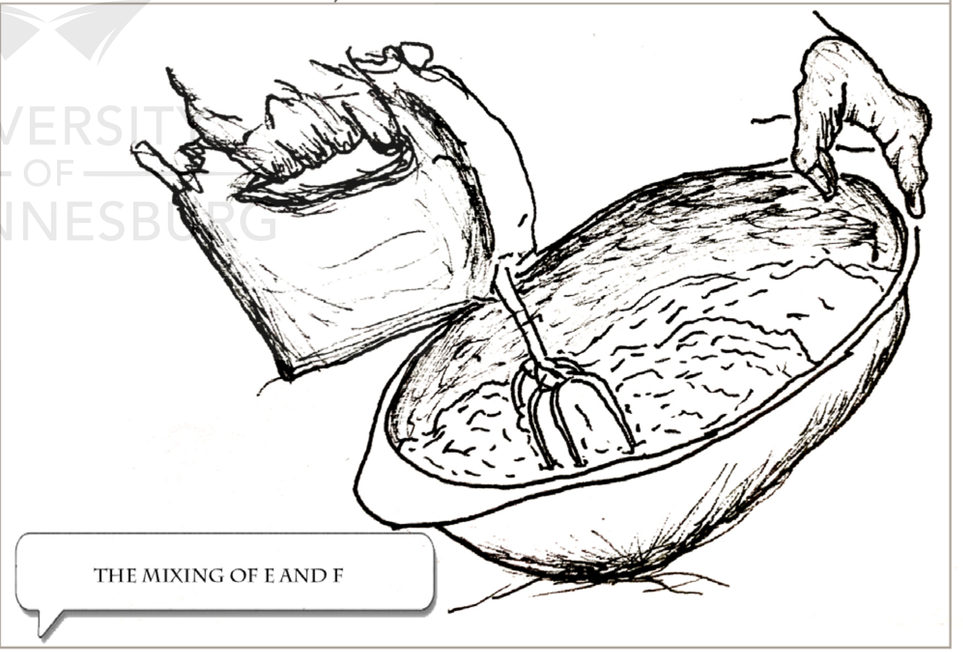
FRAME_2

The trick is to know exactly what to mix and how?

There will be a certain person who is responsible for that task to full-fill because they are the main designer in this process therefore their input is very essential.



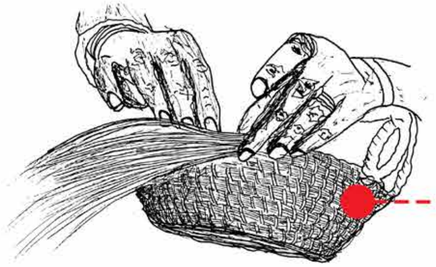


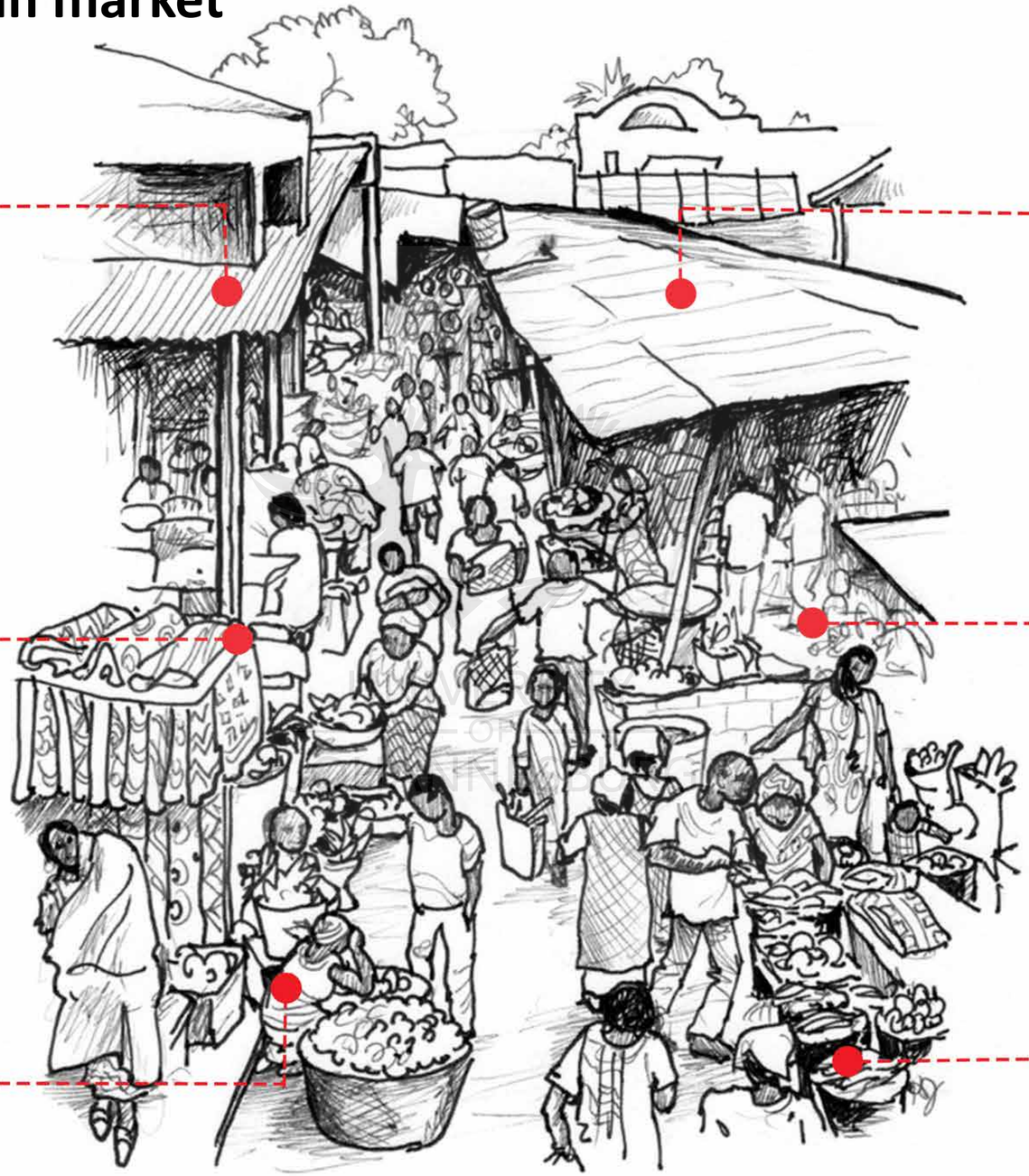


Stokvel scheme for African market

A local well known weaver who normally sells her work at her house but to offer her a new trading space.

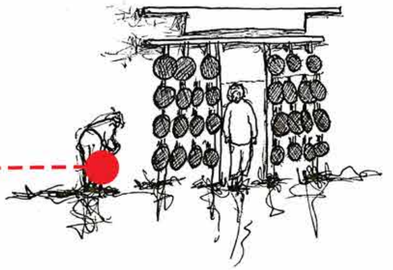
A local farmer who sells spinach and many other fruits and vegetables.





The village does not have a shopping complex therefore trading is their source of income for most residence

Most of the people in this village are farmers therefore it serves me an opportunity to invest on something that they are already good at but making it more efficient and productive.



Script

Dialogue

FADE IN:

EXT. CHIEFS HOUSE - AFTERNOON

These scene will take place in the chiefs house to request permission to begin with the construction process.

DISSOLVE TO:

IXT. THE CHIEFS HOUSE - AFTERNOON

MR ZAMA, Is a qualified Architect and the main character of the show.
CHIEF MATSANE, Is the official chief leader of the community.

MR ZAMA: Good day sir,I can on behalf of the community to request permission to start building on the community site stand no: 128 Mathibe stadium Marite Trust, ERF 405.

CHIEF MATSANE: There are certain cultural procedures that needs to be done before it can be built. You need to buy a white goat in order to use it to cleanse the site with the goats blood and the whole community must be there.

MR ZAMA:
Thank you for your time, I will do so.

The next day, ritual taking place on site before can begin.

Mr Zama slaughtered the goat and spilt the blood on every single corner of the site.

CHIEF MATSANE: Congratulations young man, the site in official for the people, the ancestors are happy to protect the project, all shall be well.

MR ZAMA: Thank you once again Chief.

SIPHO is the head leader of collecting material.

MR ZAMA We need to make use of everyone in the community when it comes to collecting materials becuase the hands the better the process therefore we need every single one involved from children to grand parents for collections.

SIPHO Which materials do we need and where will we find it?

MR ZAMA These is the list of the material that we need for the construction process:

Cow dung
Mud
Stones
grass
wood/tree branches
glass windows
steel frames
IBR Sheeting
Ceiling material
Straw
Plaster sand
Thatched
Earth

AUBREY is the head leader of collecting the necessary tools

AUBREY What kind of tools do we need for this project?

MR ZAMA Our hands and brains will be our best tools at this project because we will try it figure some of the unknown things together as we build like a united Community

Tools needed will be:

Hand tools -	Screwdrivers.	Power tools -	Drills
	brushes		saws
	wrenches		guns
	knifes		grinders
	knifes		
	shovels		
	hammers		
	wheelbarrows		

Machine tools -

AUBREY — I will try to reuse some of these tools from neighbours and friends instead of buying with money we don't even have

MR ZAMA — Okay, Thank you, keep me updated if there's anything that you cant find.

THE COMMUNITY includes every single human being on this village, they all commerce to sit down at the gathering stadium

MR ZAMA — The first step I will take is to go through the design proposal with the community in order to come up with a sollution in terms of which design proposal is best for the community. Therefore we concluded that an African market will be very beneficial to the community as a start up project to keep the motion of the project.

COMMUNITY — Most of us are farmers it will be a great opportunity for all of us to help with this initiative.

MR ZAMA — I will personally go through every necessary steps to teach you everything you need to know.

MR ZAMA gathered all the educated people who can read and write to help with this process.
TREVOR AND AMANDA, are the head leaders to oversee the process of people being educated on site.

TREVOR — Can peole who cant read and write please move to the left and people who can, move to the right.

COMMUNITY — [People were able to move to their respective groups as addressed by Trevor]

TREVOR AND AMANDA begun with the process that will focus on majors such as:
How to create form work from wood
How to make a brick from mud and cow dung
How to use any other tools on site
What is an African market?

MAPHANGA, will be the head of material collection on this project, he is a well experienced local contractor who has built most of the local houses in the

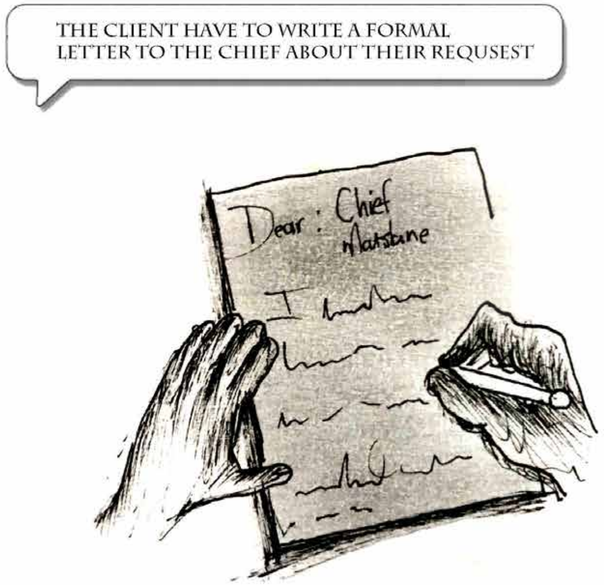
MR ZAMA — Which material will you be collection for this project?

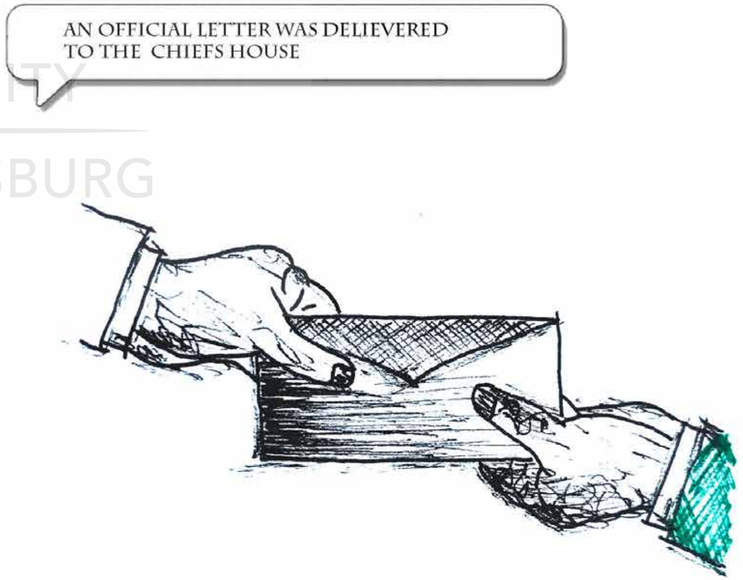
MAPHANGA — The design will be traditional and cultural as possible therefore local material will be used on this project such as:
Cow dung
grass
straw
mud
Earth

How to build Together

FRAME_1

This frame unfolds the formal aspects of the design from how one can obtain a stand. The process to writing a letter to the chief to have it approved.



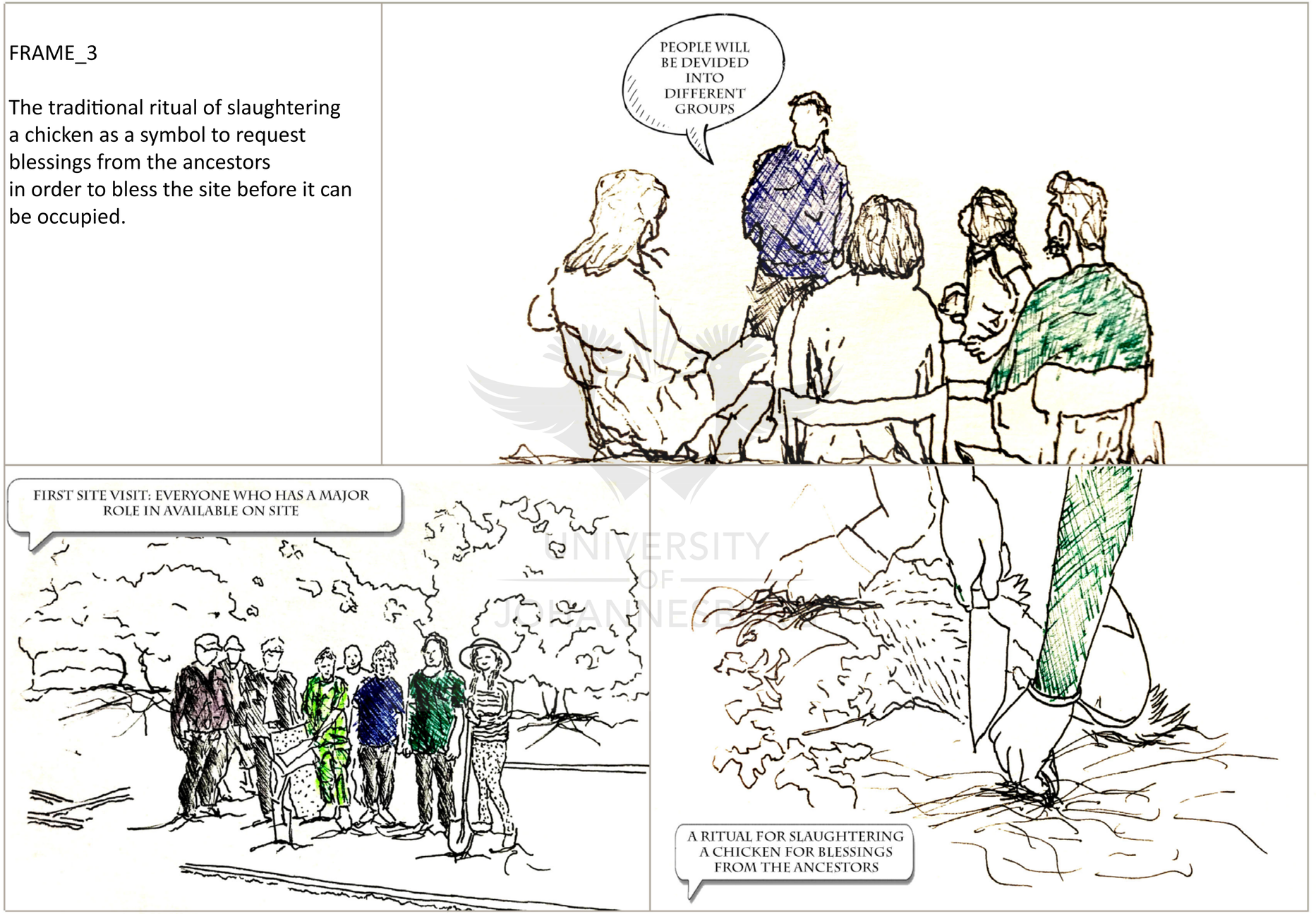


FRAME_2

This frame unpacks the collection of materials that will be used on site. The main focus is how does one collect local materials without using a big truck or a van but to keep it at a small scale of how to transport materials from the local forests. To also unfold which type of tools to be used to cut down other materials.

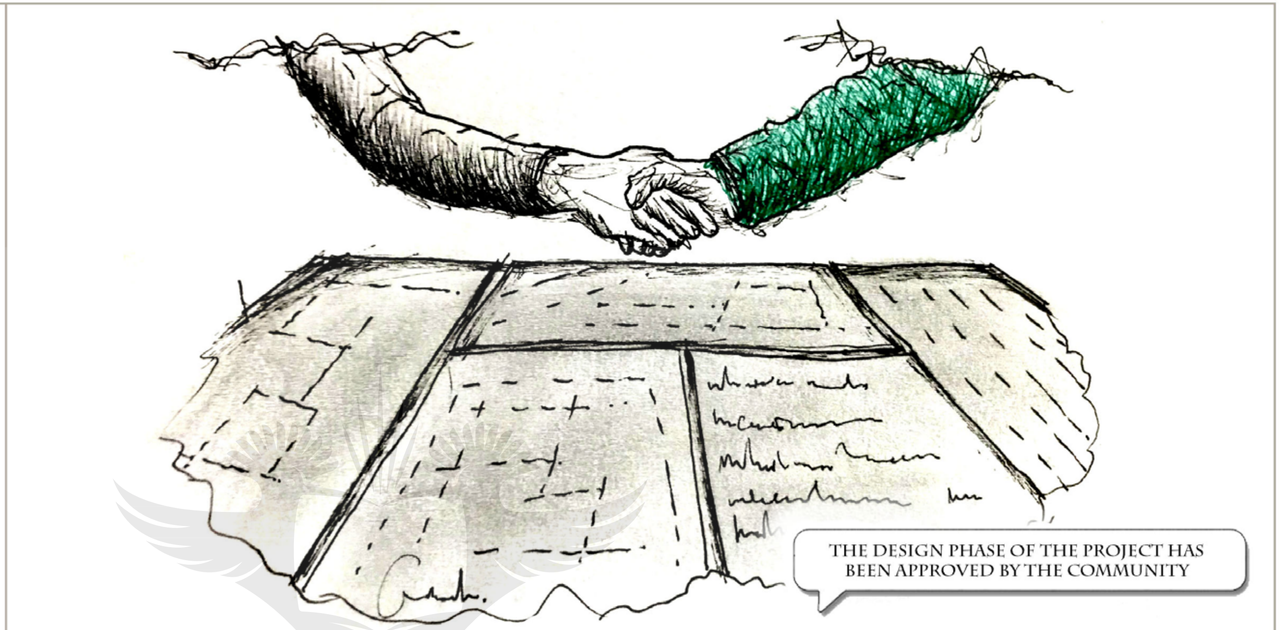
FRAME_3

The traditional ritual of slaughtering a chicken as a symbol to request blessings from the ancestors in order to bless the site before it can be occupied.



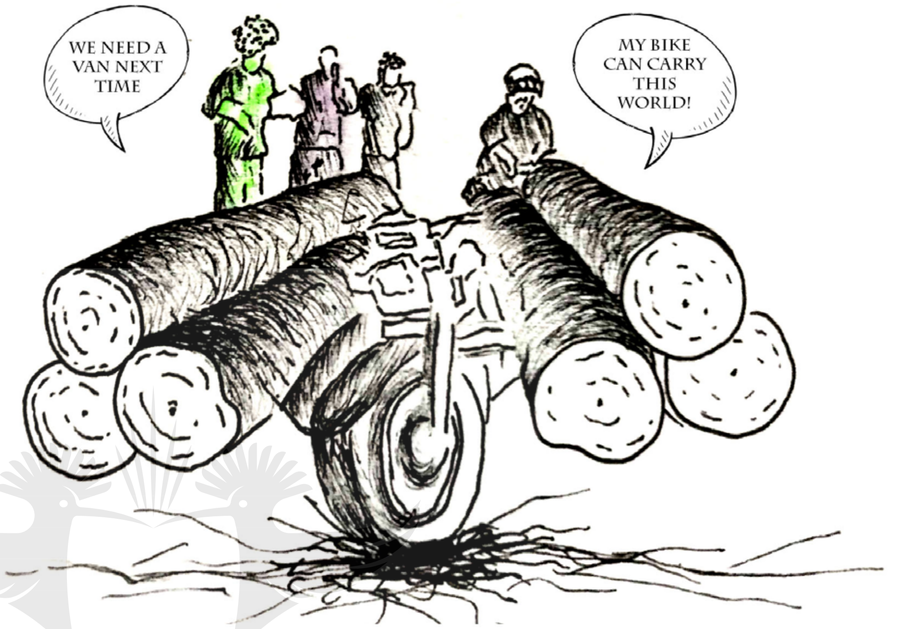
FRAME_4

This frame tells a story of how people will build together, how many people are required to lift a certain timber decking and the process of how the fixings and layering of the material is being made. To emphisize of how team and community building work and its effectiveness.



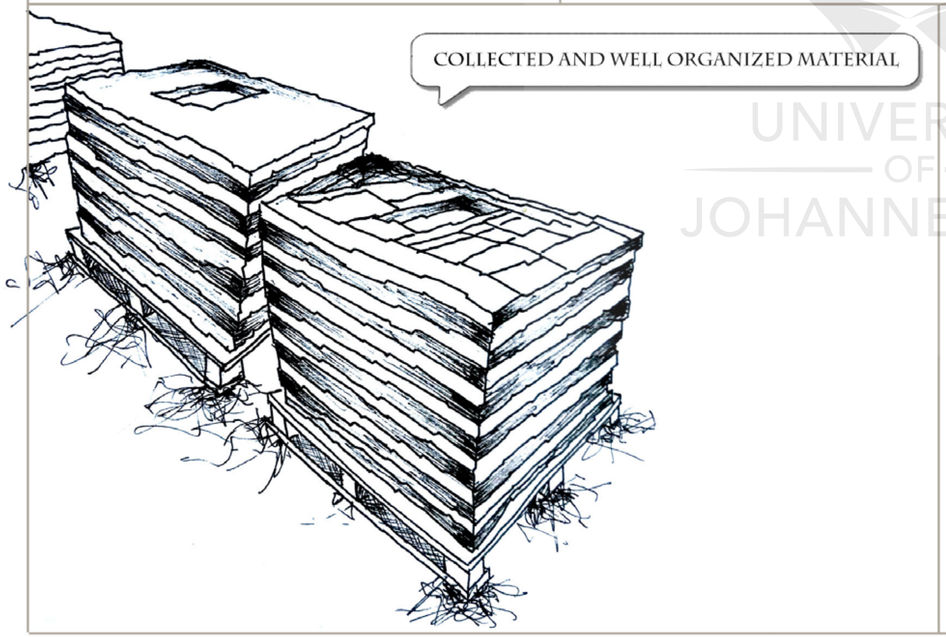
FRAME_5

The availability of local material is very essential to the concept of this proposal. To use less transportation as possible, the use of wheelbarrow or a designed motor bike with side pockets to carry out and support the timber from the forests.



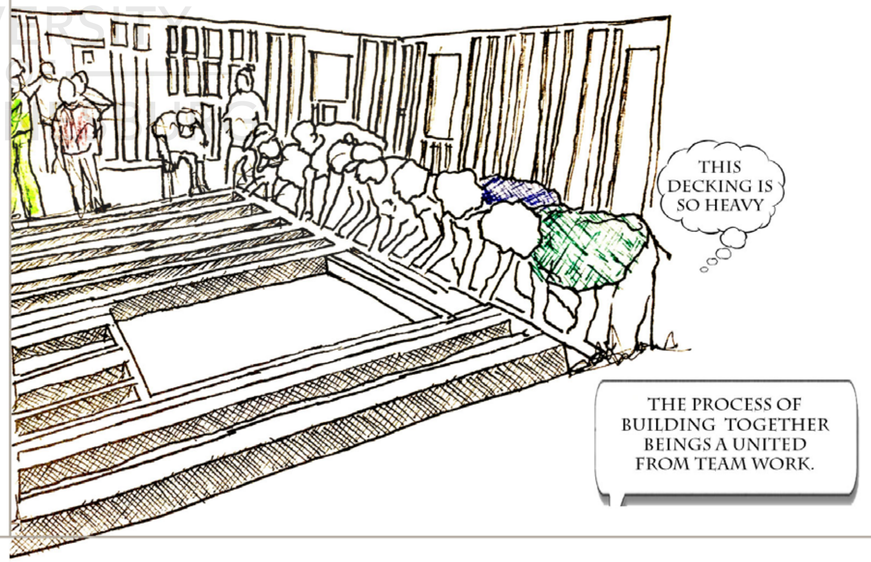
FRAME_6

To follow tradition of safety majors as to teach workers on site to wear appropriate PPE materials and to always practice safety.
Packaging and storing of material differs from types of materials to materials.



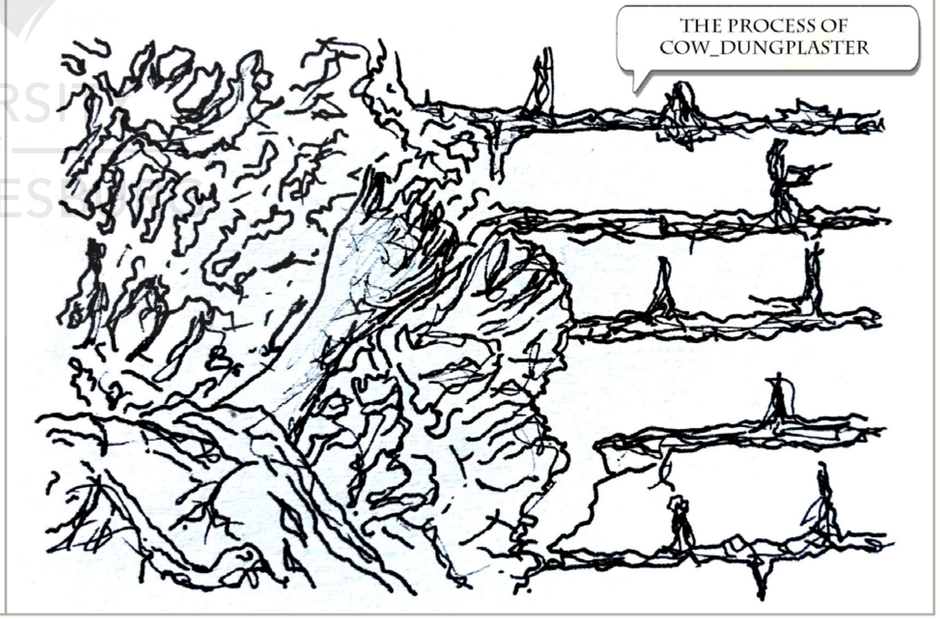
FRAME_7

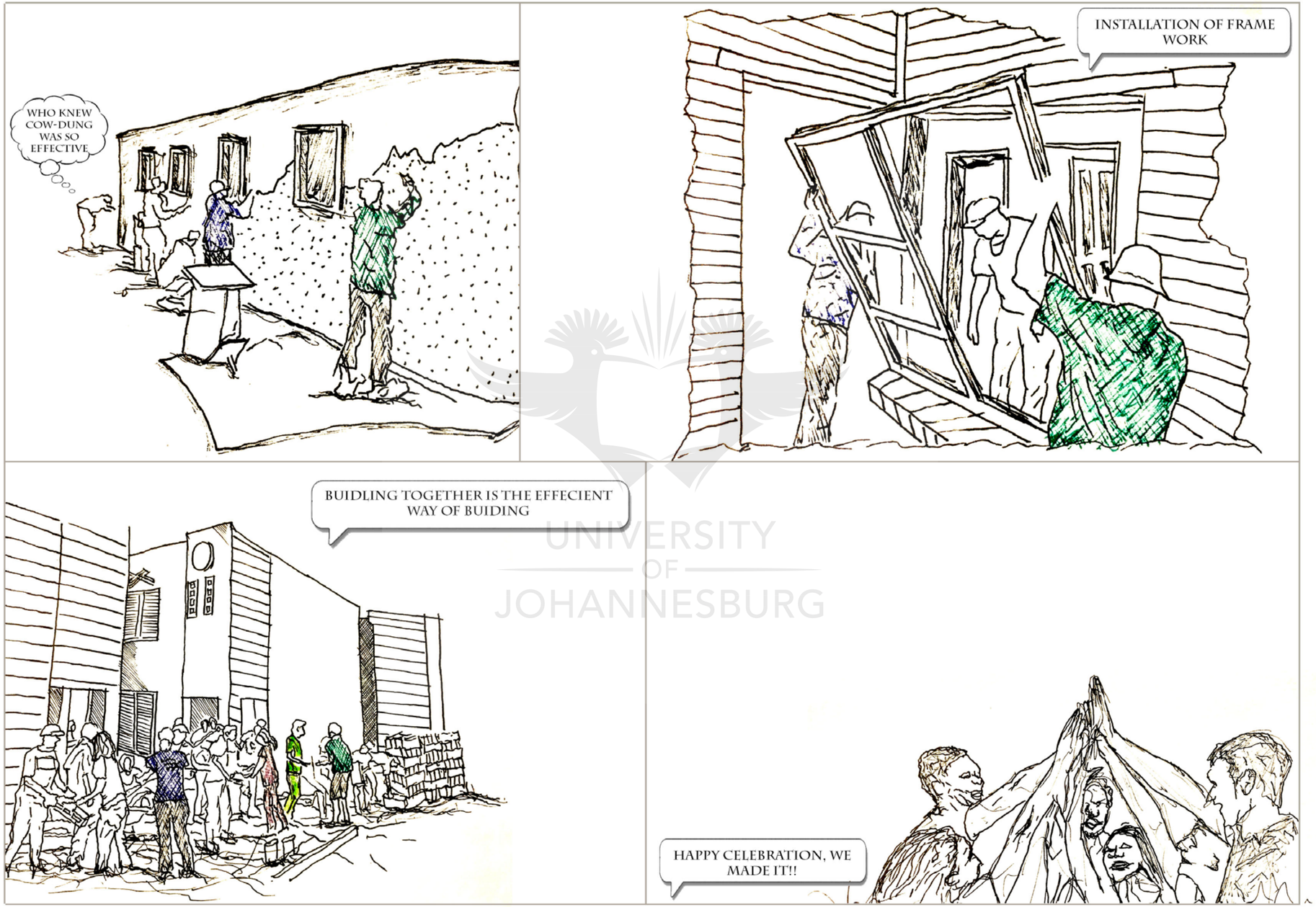
Using proposed ratios for mixng the different types of material is important because one needs to know how much cow dung and earth needs to be added to create the flooring/plaster with cow dung.



FRAME_8

To have experienced workers on site is the main goal to this proposal. The more people working together on site, the better the motion of the building process as illustrator demonstrates the techniques of how it is done.

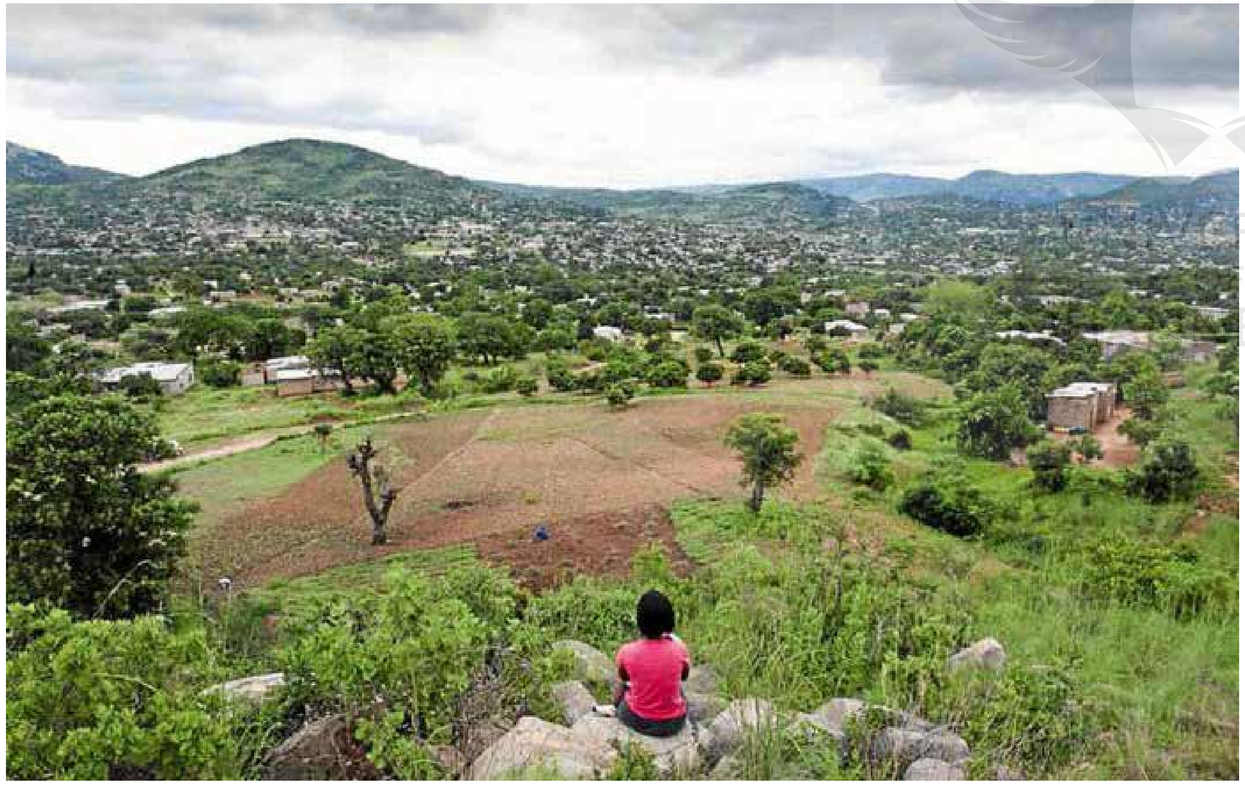




Site comparison

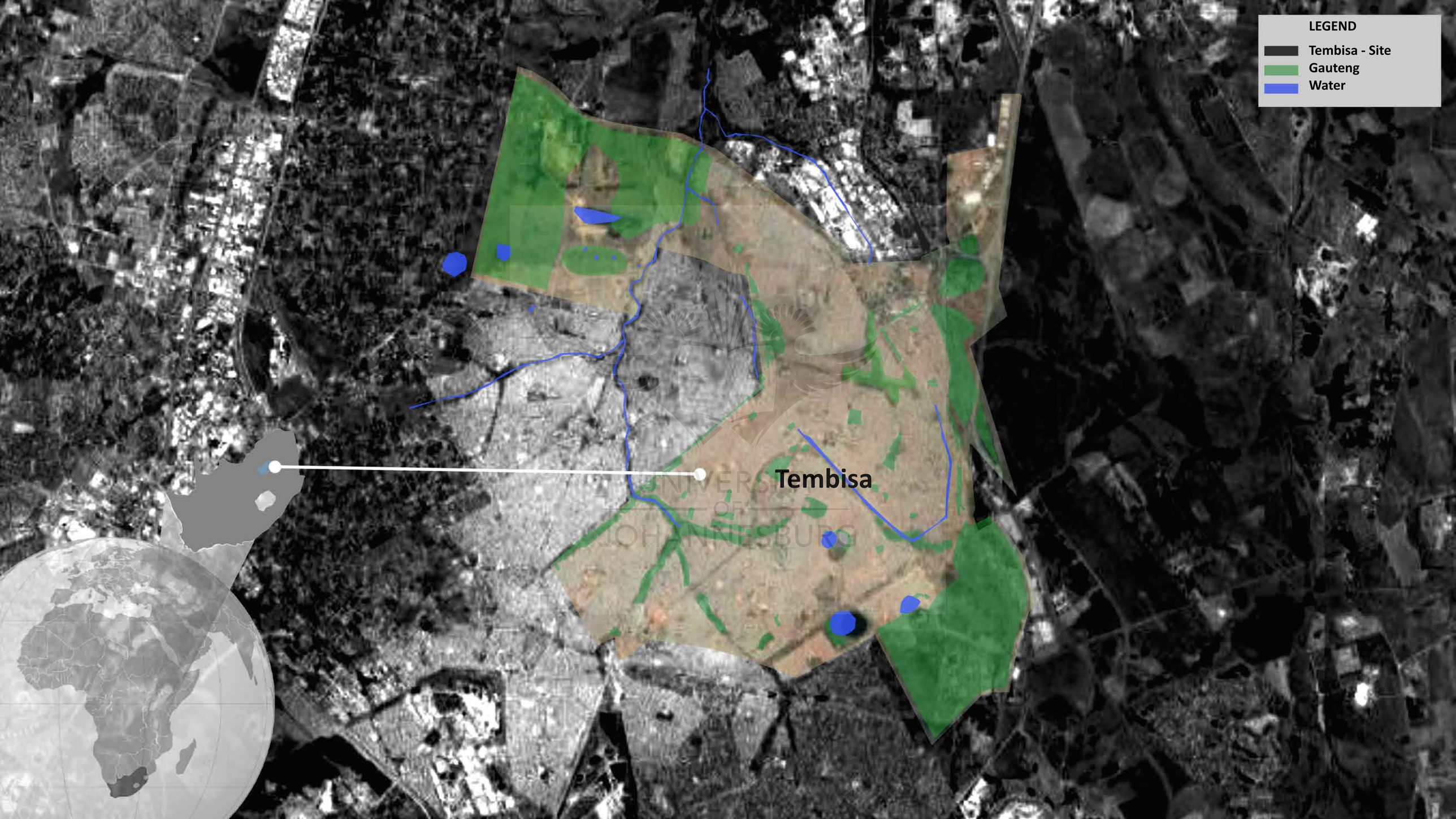
Rural Area Marite trust

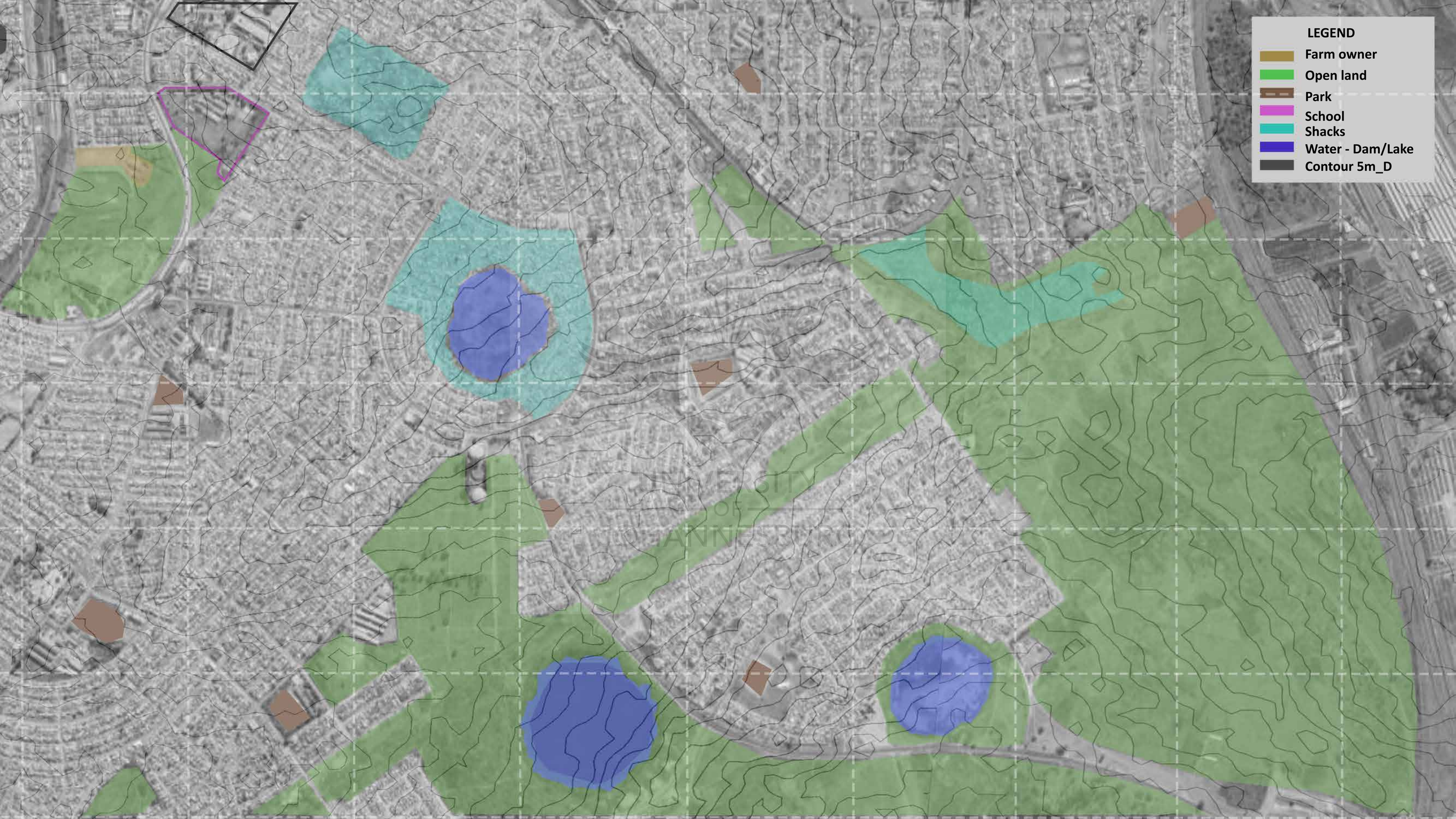
A significantly large proportion of South Africa's population (43 %) still live more or less permanently in rural areas and an even larger proportion of this group are poor (71 %) (StatsSA 2003). Rural development is a strategic priority of the 2009-2014 administration and finds expression in Outcome 7, as well as the Government of South Africa's (GSA) plan of action.



Location - Tembisa

Thembisa, formerly Tembisa, is a large township situated to the north of Kempton Park on the East Rand, Gauteng, South Africa. It was established in 1957 when black people were resettled from Alexandra and other areas in Edenvale, Kempton Park, Midrand and Germiston.


LEGEND
Tembisa - Site
Gauteng
Water
Tembisa


LEGEND
Farm owner
Open land
Park
School
Shacks
Water - Dam/Lake
Contour 5m_D

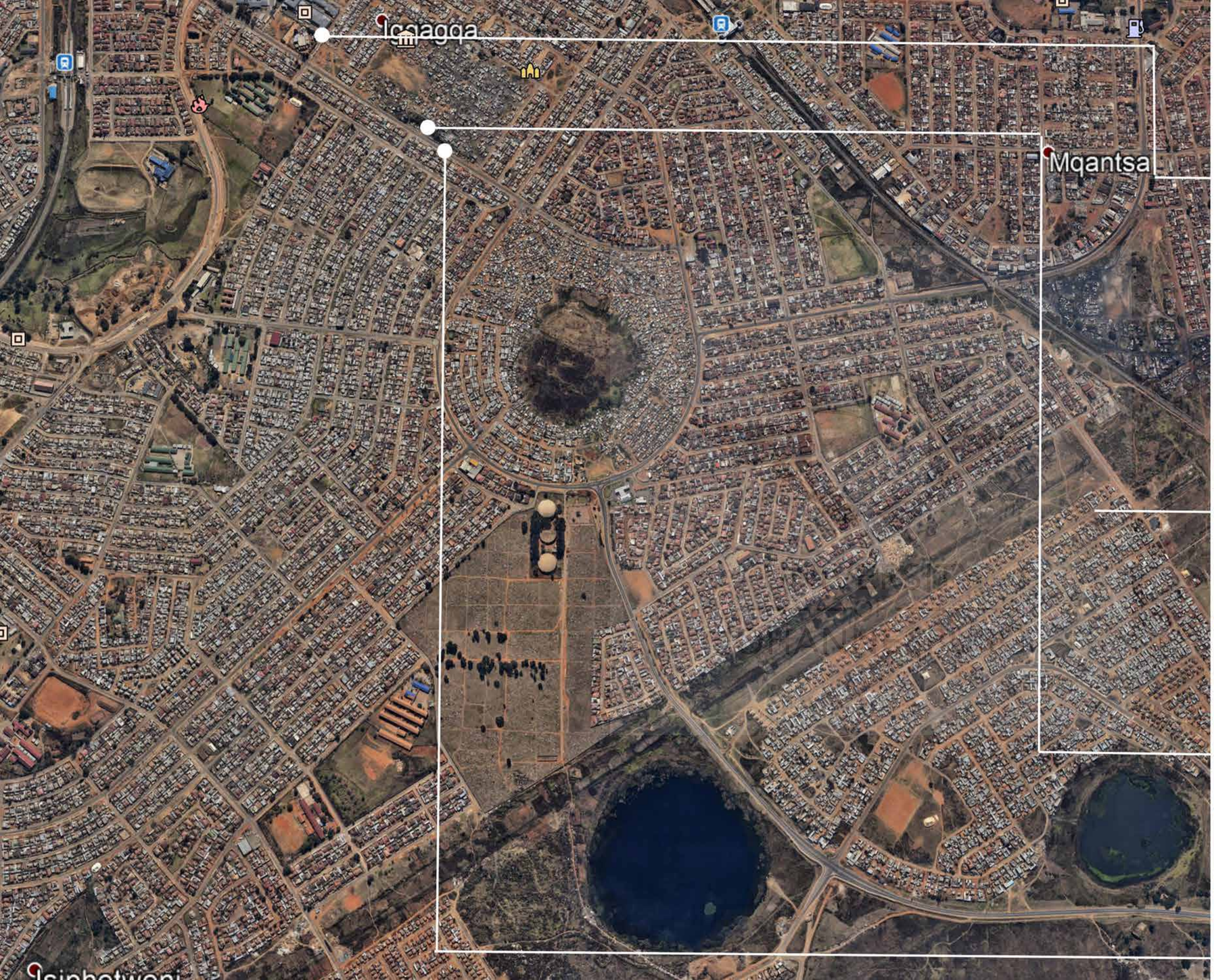
Availability of resources

There are a number of water resources on site like the often used Lake and dam to collect water. This will be used as a source of water to the proposed site

The dam and lake are not 3km away from the proposed which serves as an advantage to the project.

Mqantsa

Closer into the informal settlement



shopping center

There's available food/clothing market. The Juxtaposition of the township compared to the informal settlement next to it.


Icwagqa
Mqantsa

Why informal settlemets?

The project is about building with traditional building techniques in informal settlements by using locally available material. This project proposes to introduce people into building this way rather than building shacks in informal settlements.

INFORMAL SETTLEMENT AS THE TARGET MARKET

- Building this way is very effective because the material being used is for free and are locally sourced.
- It is a durable and long lasting way of building a house.
- It is safer and able to fight against natural cold/hot conditions.
- It is cheaper and saves people a lot of many.
- It has a long sustainable history to it that has been passed on from generations to generations.
- Many people will benefit from this project.
- It enhances the quality of peoples lifes.
- It is time effective.
- It creates an educational platform as knowledge will be exchanged in the process

INTERVIEW

Living in an informal settlement

INTERVIEWER : Ishmael Mashaba
INTERVIEWEE : Marcus and Brian
LOCATION : Tembisa, Gauteng
LANGUAGE : English and Zulu
DATE : 7 September 2020

The aim of the interview is to find out which types of skills do people living on site currently have because their knowledge to how they do things will be important to the project due to their contribution and hard work.

Dialog Interview

Ishmael : Are you comfortable with me showing your face on the recording of the video?

Marcus : Yes, its okay.

Ishmael : Have you done an interview like this before?

Marcus : No, its my first time.

Ishmael : Do you have a family?

Marcus : Yes, I am a father of 4 children and my wife works at a local shop.

Ishmael : How are the living conditions around the area?

Marcus : It is a very rough time to be living under this conditions but we do try to make a better living out of it. When it rains we face serious issues as our shacks are not well built enough.

Ishmael : Where do you source or buy your timber from?

Marcus : We buy with bulks because we get a better discounts rather than buying singles.

Ishmael : What do you do with the timber?

Marcus : I am a carpenter I make carboards for people in the area, most of my clients are the people living in the main township with better houses because the people I live with can not afford my services due to their financial difficulties.

Living in an informal settlement

INTERVIEWER : Ishmael Mashaba
INTERVIEWEE : Jabulani and Mbali Cele
LOCATION : Tembisa, Gauteng
LANGUAGE : Zulu
DATE : 7 September 2020

The aim of the interview is to unpack some of the current methods that people are currently building with and how they access their materials being used.

Dialog Interview

Ishmael : Are you comfortable with me showing your face on the recording of the video?

Jabulani : Yes, its okay.

Ishmael : Have you done an interview like this before?

Jabulani : No, its my first time.

Ishmael : Do you have a family?

Jabulani : Yes, we have 3 children.

Ishmael : Where did you live before you came to Gauteng?

Jabulani : We are from a small village in Kwa-zulu natal called emcubeni.

Ishmael : What are the reasons for relocating?

Jabulani : To find better jobs in the city and a better way of living.

Ishmael : Do you know how to build with traditional building methods.

Jabulani : I do not know how to build like that but people from my village build with mud bricks and using thatch for roofing. My granny who passeed away was able to build with mud, she built our house at home.


SITE

SITE

Design Intervention

Reblocking and proposal

Purpose

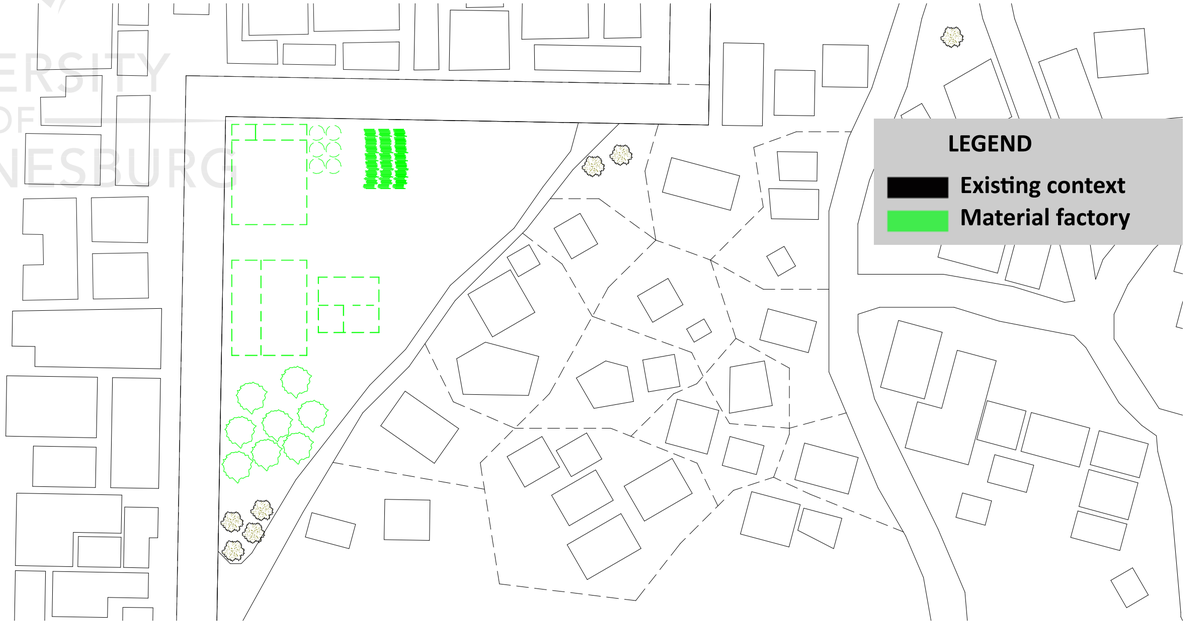
Informal settlements are inherently unstructured in nature, lack adequate services, regularly have high population densities and can experience social problems. Thus, fires can easily propagate rapidly through such areas, leaving thousands homeless in a single fire. The purpose of this paper is to present an appraisal of various interventions and strategies to improve fire safety in informal settlements.

Reblocking is a new concept in the upgrading of informal settlements. Unlike traditional social housing projects, reblocking occurs on site and does not relocate communities to areas where economic opportunities may not be as available

Reblocking

- Introducing traditional building techniques on an informal settlement in Tembisa.
- Before moving any existing houses, identify every open space to be built on

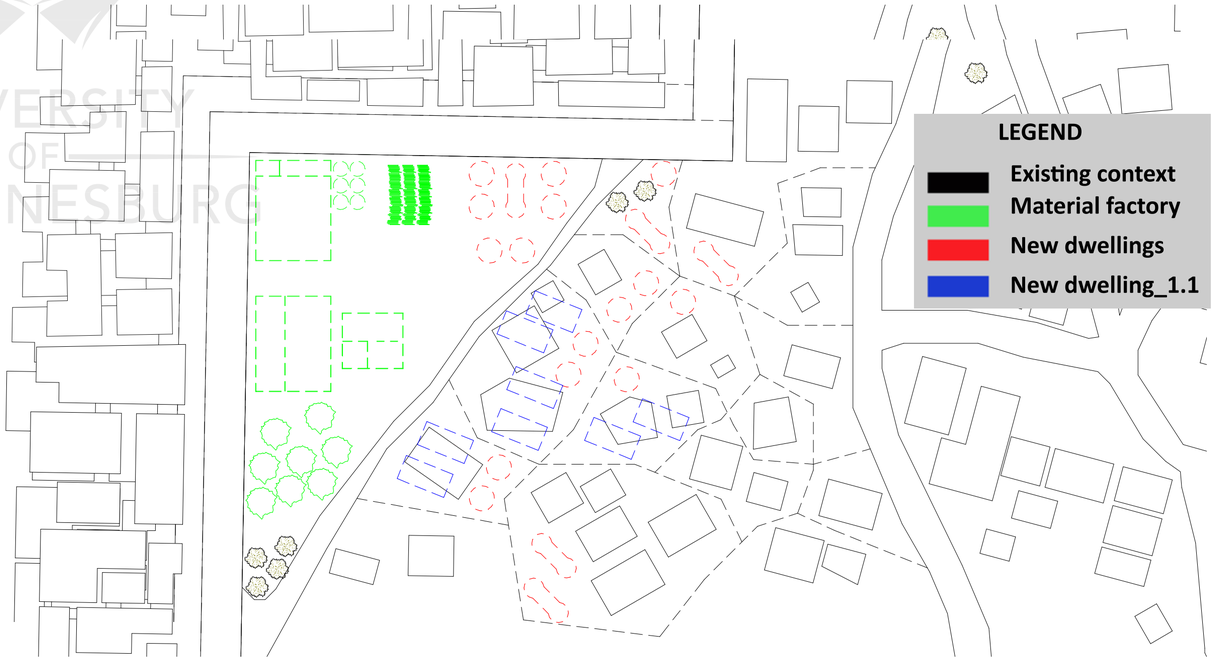
- Use open space for the material factory:
  - Cattle kraal to keep the cows for cow dung
  - Outdoor storage for thatch
  - Outdoor storage for mud bricks
  - Open storage for earth/soil
  - Open storage for bamboo canes



Reblocking and proposal

- Build small family rondavels on the open land, next to existing houses.
- Existing houses not to be demolished at this stage of the process.

- A certain resident may build their new dwelling next door to their existing home.
- Once the new rondavels is completed, the neighbour may move into the new.



Reblocking and proposal

- The old shacks to be demolished after new dwelling completion.
- New dwellings to be occupied by the neighbours or the closest people to the new house.
- Rectangular mud houses roofed with thatch to be introduced on site.
- To be built on open lands.

- The aim is to first build on open land.
- Then demolishing takes place.
- To build on demolished NEW open space for new dwellings for more people.
- This sequence is to be introduced through the settlement.
- New shopping/tuckshops to be built next to the soccer filed.

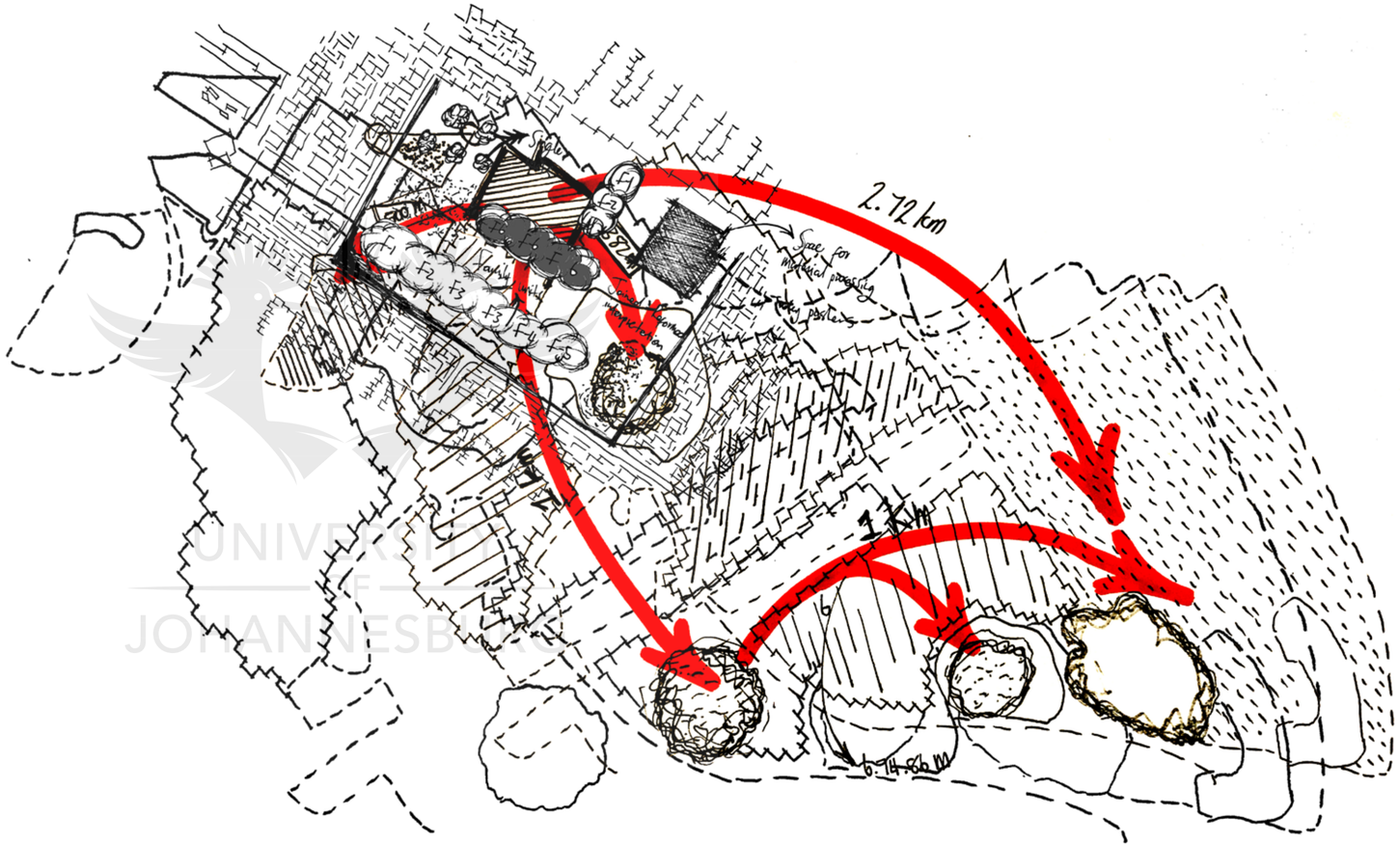

AFTER
Cattle kraal for cow dung
Bamboo canes
Thatch
Proposed innovated building techniques to be explored on site
Open space to mix and process materials.
Mud bricks
Proposed Double storey houses
Innovated rondavels

Site process

How it will work

How the material is collected from the fields is very crucial to the outcome of the project because certain material works better when it is still wet and bendable rather than drying it then use it, it often breaks when its dried out therefore this an important factor.

Separating each material according to its factor. to unpack how to pack/store thatch and move it around the site without breaking of damaging the materials.

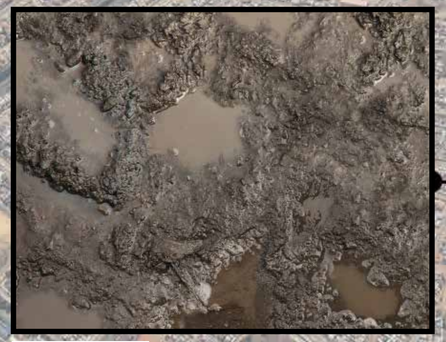


Cow dung - Binder + Plaster

Distance 500m

Distance 720m

Distance 1.1km



Mud - Walls

Building with mud
The distance from the proposed site to the wetland to collect rich mud emphisizes how transportation can be reduced from this project

Bamboo - structural

The substitution of using bamboo instead of mapane tree branches is very crucial to the project because it opens up a wide rang of innovating this building methods from its original development.

LEGEND
- Proposed materials
- Site
- Open land
- Routes

Distance 2.72km

Distance 2.89km

Distance 3.14km

Mopane trees - structural

Hyparrhenia hirta grass - Thatch roofing

Delmas rocks - Cladding + foundation

Isiphetweni

Google Earth

Material processing

Growing bamboo

Process questionnaire

What type of seed?
Subtribe of the family Poaceae

Type?
Bambusinae - clumping type

Soil type?
Clay, pH soil slightly acidic, loamy soil

Flowering season
Early summer. December and January.

Growth height
7.5meters tall at mature level

Gardening skills?
Avarage

Weather conditions?
Full sun or partially sunny

Shoots
Appear every spring once a year

Water needed?
It prefers alot of water. grows better on a wetland

Bamboo growing timeline

BAMBUSINAE

Bamboo is considered as one of the most fastest growing plant in the world.

The Bambuseae are the most diverse tribe of bamboos in the grass family (Poaceae). They consist of woody species from tropical regions, including some giant bamboos. Their sister group are the small herbaceous bamboos from the tropics in tribe Olyreae, while the temperate woody bamboos (Arundinarieae) are more distantly related. The Bambuseae fall into two clades.

YEAR 1 - 900mm	canes - 2
YEAR 2 - 1400mm	canes - 5
YEAR 3 - 2800mm	canes - 9
YEAR 4 - 4200mm	canes - 28

Bamboo shoots occur every spring once a year therefore the quantity canes blossom more and more each year.

The upright stems of bamboo are called culms. Most species of bamboo will produce flowers after a growth cycle consisting of a number of growth seasons.

Water reed ready for thatch

Process questionnaire

How does a thatch roof last?
40 to 50 years.

Flowering time?
September to June [spring, early summer]

What type of seed?
Hyparrhenia hirta.

Soil type?
Most soils, greenland, along river, rocky/stoney slopes, Sandy, Clay, Loam. Along side roads.

Grown height?
300-800mm

Gender?
Raceme has 0-1 homogamous (same sex) pairs of spikelets.

Weather condition needed?
Sunny, gradually rainy

Gardening skills?
Average

Hyparrhenia hirta, Thatch.

For fine thatching, the stems must comply with quality standards: a diameter between 1.2 and 2.5 mm at butt end, a length above 0.8 m, absence of seeds and loose material, straightness and maturity. It is also used to weave mats. A very drought-resistant species, Hyparrhenia hirta can be used to reclame soil and control erosion

Hyparrhenia hirta is probably the most popular thatching grass used in South Africa. It is grazed by livestock early in the growing season and after fires, but becomes less palatable for grazing later.

In South Africa and the USA this grass is seen as a drought resistant grass, which protects the soil and stabilizes hard, gravelly soil and eroded places. It is also used to weave mats and baskets.

2 Months - 60mm
10 Month - 500mm
1 YEAR - 1000mm
2.5 YEARS - 1700mm

Cow dung

Process questionnaire

How many cows do you own?

18 Cows

How long does each cow eat per day?

8hours a day.

What types of plants or grass do they eat?

They eat according to their nature, I do not feed them but mostly any natural greeneries.

How many times does each cow produce the dung?

It depends on how much it ate but normally it can release 5 times a day, 3.5kgX5 = 17.5KG per cow, a daily.

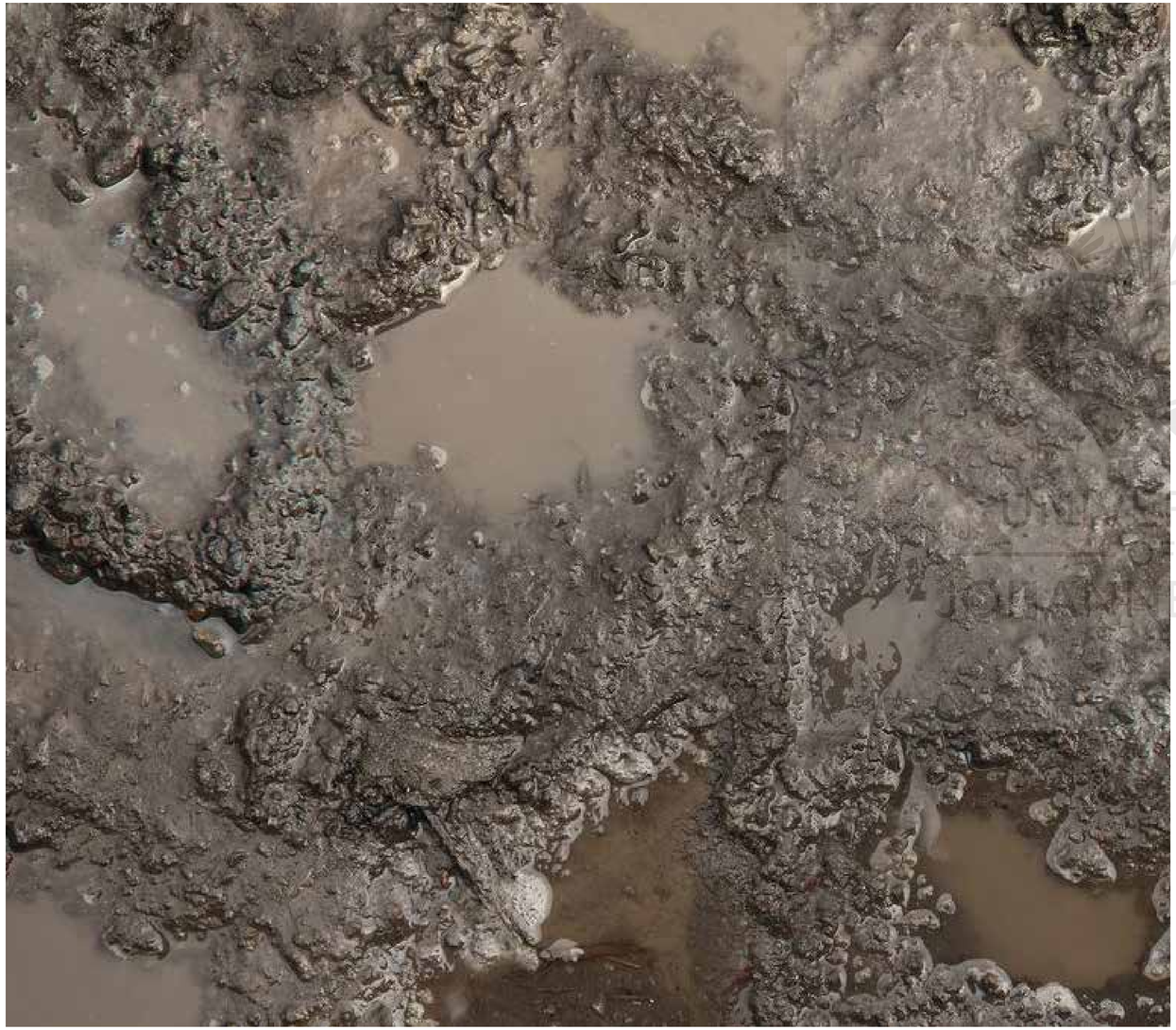
What is the difference between a bulls dung compared to a calves dung?

The bulls dung contains alot of grass
The calves dung contains less grass but with milk within.

Do you sell the dung or give it away?

Normally, I do not sell it. Whoever asks, I do give them but I sometimes charge R200 per bakkie load.

Mud



Where to source mud?
One can find soil anywhere becuase we live and breathe amongst soil but the tricky part is how to deal with the dug up holes after using the soil because the area will be filled with holes alternatives to this problem can be solved by using those holes as sawege services and other form of service.

Mud is soil, loam, silt or clay mixed with water. It usually forms after rainfall or near water sources. Ancient mud deposits harden over geological time to form sedimentary rock such as shale or mudstone.

Mud can be made into mud bricks, also called adobe, by mixing mud with water, placing the mixture into moulds and then allowing it to dry in open air.[1] Straw is sometimes used as a binder within the bricks, as it makes them a composite.

Delmas cladding rocks

Process questionnaire

What type of rock is it?

What type of process does it occur from?

What is the process of separating them??

How strong are they?

Where do you find them in the world?

How big or small do they occur?

How durable are they?

Equipment needed to cut them?

Can they be broken easily?

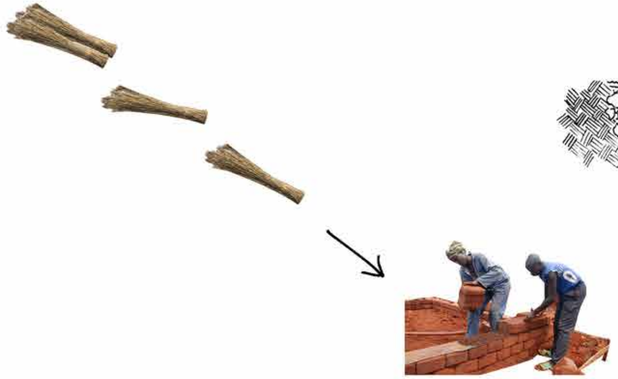
A place of preservation of South African traditional building techniques

The beginner!

Slaughtering a chicken

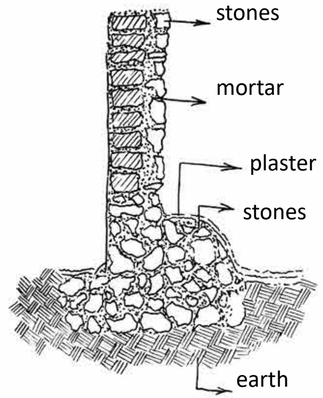
Ritual ceremony to spill the chicken blood on every corner on the new site to be built on.

Community engagement as stokvel labour



Expects leading the building process

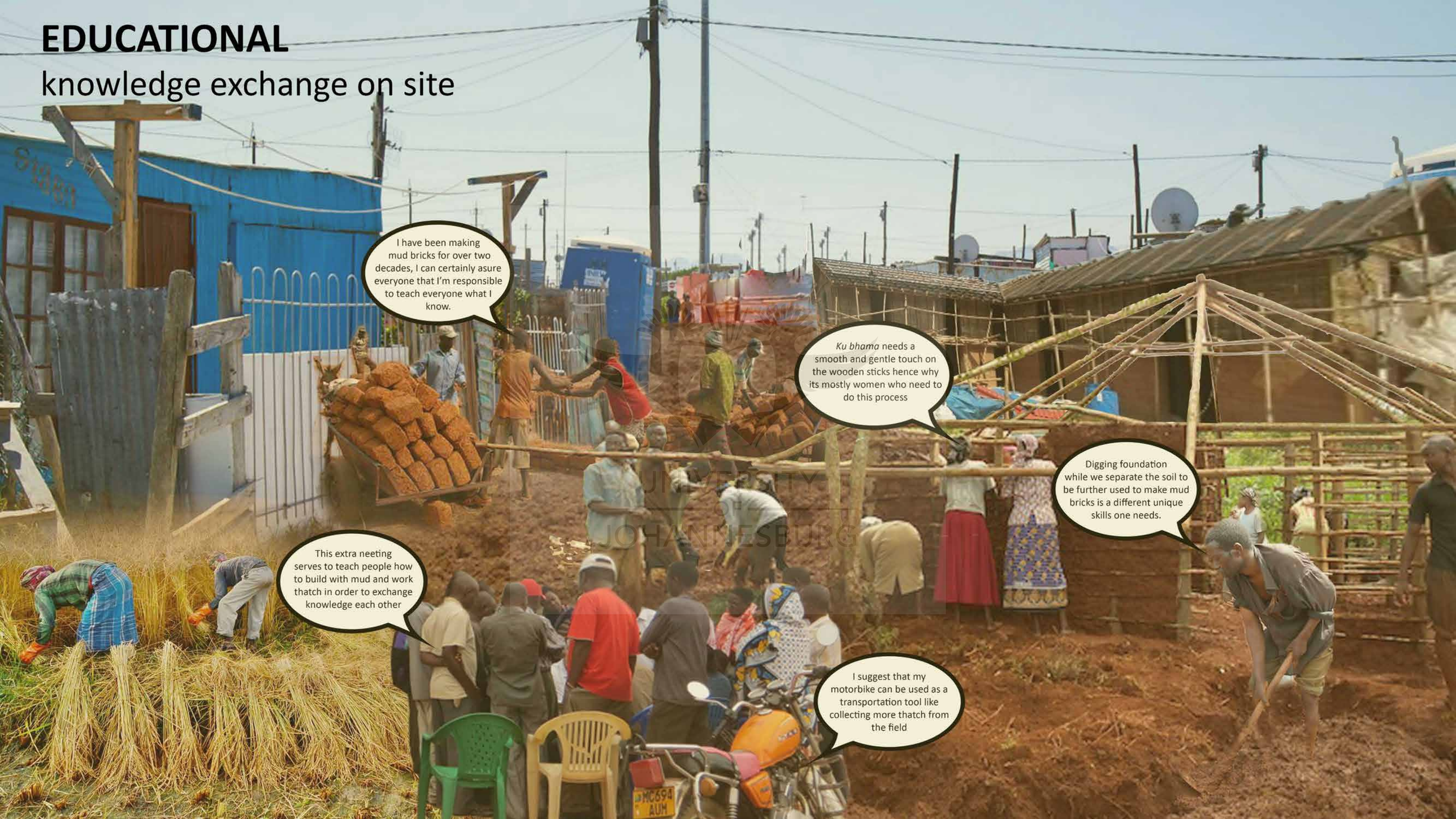
Foundation detail



Only the eldest women in the village is allowed to plaster the new house with cow dung

EDUCATIONAL

knowledge exchange on site




The collection of thatch for roofing purposes is very essential because the thatch is grown and collected locally from our nearest field. It normally takes us 1hour to reach the site.
I have alot of experience regarding making mud brick becuase my late granmother taught me how to build a mud house from a very young age
Avarage bamboo grows to mature level from 3-5 years to be used to its full capability therefore bamboo will be planted and grown locally from the nearest lake in Thembisa
I am a coloured women who lives in Thembisa but I grew up in a village in Limpopo where my granmother currently lives, I am familiar with vernacular architecture becuase I grew up in a mud hut.

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